THE AMERICAN
GAS LIGHT JOURNAL

VOL. XCV., No 5 — NEW YORK, JULY 31, 1911. — WHOLE NO 1886.

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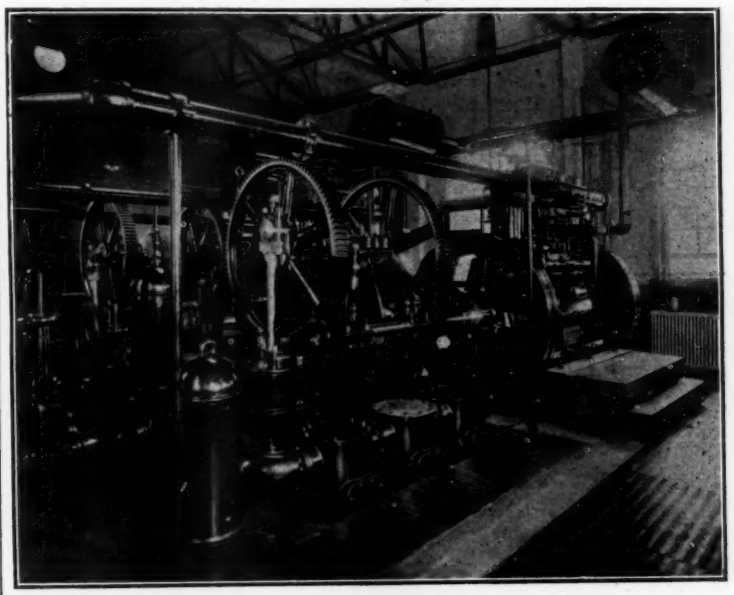
Fire Protection.

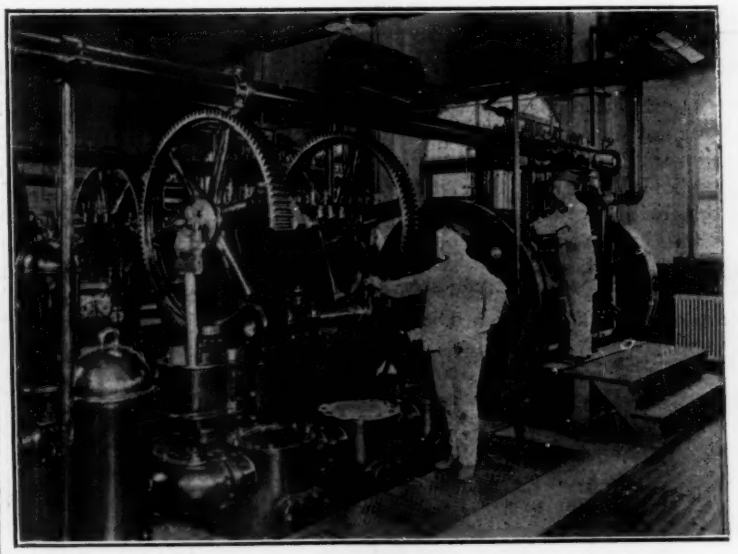
An important question which must be considered by small towns coast communities, large or isolated manufacturing plants, is in the matter of fire protection. Of course, the matter of expense enters in pretty much every such case, and, in addition, is the allied problem of adequate water supply under sufficiently high pressure. However, it is possible—and it has been proven so in numerous instances—to solve the whole problem by means of a powerful pumping plant to be operated only when necessity arises. One of the most notable which may be cited is that at Coney Island, New York's cosmopolitan pleasure resort.

The buildings on this island have been and are very inflammable, hence in consequence of the conditions fire policies were limited to 10 per cent. of the value, and 5 per cent. was the rate charged. Although the location is quite distant from the general fire system of the Borough of Brooklyn, so to maintain an adequate number of fire steamers to cope with the possibilities would entail a very heavy expense; but an abundance of water was, however, available. First, the city supply; second, the salt water of the immediate vicinity,



View of Goulds' Pump and Nash Engine.

if such water could be used. The question of power was, of course, important. What was needed was a solution of the power question which would enable a large total of power to become available quickly, that would entail little or no expense in the intervals when not required. This problem was successfully solved by using gas engines, operating them with ordinary illuminating gas. A large



Starting Engine and Pump.

gasholder was situated near by to which suitable connections were made. Three Nash gas engines of the vertical, 3 cylinder, 4-cycle type, were installed. The cylinders are 13¾ inches in diameter, the stroke being 16 inches, and when these engines are run at 260 revolutions per minute a horse power of 175 is developed by each. This result is accomplished with a gas having only 590 British terminal

units per cubic foot by using only 17.4 cubic feet per brake-horse power per hour. The valves of one cylinder in each engine are arranged to permit the use of compressed air to start it off, and there are two separate air compressors, one of which has its own small gas engine. There is in addition a series of storage tanks for compressed air, with capacity equal to starting all engines twice. From this it will be seen that very adequate provision has been made for starting up. In fact, the men in charge do not have to exert themselves at all. The compressed air starts the engine forward, operating through one of the 3 cylinders, and the other 2 cylinders quickly develop power from the gas; in one or two revolutions, in fact. The engine is put into full operation by gas in 20 seconds; as all 3 engines and the whole plant as well can be put into full operation in about 2½ minutes, it will be seen that we have a source of driving power which becomes available in a very short space of time.

This power equipment drives a very efficient pumping plant, which consists of 3 triplex, double-acting piston pumps, built by the Goulds Manufacturing Co. Each of these pumps is directly connected to one of the gas engines and forms with it a water handling equipment independent of the other pumps. The pistons have a diameter of 12 inches and a stroke of 14 inches, and there is a capacity of 40.3 gallons at each revolution of the 3-arm crankshaft. As the ordinary angular speed of the crankshaft is 38.5 revolutions per minute, a pumping capacity of 1,551 gallons per minute per pump can be readily calculated. Each pump is driven by a pair of pinions which engage with spur gears arranged on the ends of the crankshaft. The gear ratio is 1 : 15. The suction pipe has a diameter of 12 inches; the discharge piping is 10 inches.

Each of the pumps has a by-pass permitting the discharge to pass into the overflow pipe. While the engine is getting underway the by-pass valve is open; but when the full speed is attained this valve is gradually closed by an electric motor. The valve is opened or closed in 20 seconds, and the electric motor automatically stops when its work of opening or closing the valve is completed. The total capacity of the 3 pumps is 4,650 gallons per minute, and the pressure is 150 pounds per square inch at the pumps. For a hydrant ¾ mile away the pressure falls only to 140 pounds when the full capacity of the plant is employed. The area protected totals about 65 acres. Numerous hydrants are so distributed that the whole energy of the pumping plant can be concentrated upon any one block of buildings, which hydrants have 2½-inch hose connections and are joined to the service mains by 8-inch piping. The full capacity of 4,650 gallons per minute can be developed with 15 to 20 streams.

City water is brought into the plant. In addition there is suction connection with the adjacent body of water known as Coney Island Creek, the water of which is salt and the supply inexhaustible. In case the city water should fail the salt water supply could be utilized.

This pumping plant seems to have been admirably conceived. It is economical, since it is operated only when needed, and the attendance expense is low. It can be started with great rapidity and with great certainty. If the city water fails, the Atlantic Ocean can be called upon. The whole plant need not be put into operation, if the situation does not require it; and the starting up of the plant does not depend upon the muscular strength of the persons at the moment in attendance. A great volume of water per minute is available. Further, the streams are very powerful, so that considerable heights can be reached. A pressure of 140 pounds per square inch is equivalent to that obtained from an elevated tank or a standpipe 320 feet high.

The high pressure pumping plant had a real tryout in 1907, during a serious conflagration. The total capacity of the plant is, as previously stated, 4,650 gallons per minute with a pressure of 150 pounds per square inch at the pumps, and the 1907 blaze caused demands about equal to the capacity. Several steamers were summoned to the spot, but only a few were really used, according to the newspaper account. The cost for gas for the 16-hour run of the plant amounted to $58.

Some weeks ago a great conflagration broke out in the entertainment place known as "Dreamland." The plant had never been increased in capacity by additional units, although the size of the place had grown and the total length of mains was much extended. It is said that as many as 30 connections were made during this blaze, hence there could be only one result—a great loss of pressure. Some of the electrical people seemed to take the absurd view that the plant could be expected to furnish any quantity of water at high pressure that an emergency might happen to require. A gas-driven pumping plant cannot be expected to do more in such a situation than an electrically driven one, and surely no reasonable person finds fault with a 2-horse power electric motor that is unable to furnish 4 or 5-horse power. The manufacturers of the pumps made inquiry at the Commissioner's Office of the Department of Water Supply, Gas and Electricity of New York city, upon this subject, whereupon Deputy Commissioner J. W. F. Bennett replied that the pumps worked satisfactorily during the fire, and that the overdraft "necessarily resulted in the reduction in pressure shown on the charts." The capacity is such as to supply 15 or 18 hose with high pressure streams; in fact, to get 30 or 36 such streams is not difficult. It is only necessary to duplicate the plant.

Liability of Gas Companies for Injuries Resulting from Escape of Gas.

[Prepared for the JOURNAL by MR. JOHN EDSON BRADY.]

INJURIES RESULTING FROM FIRE AND EXPLOSION.

Duty of Inspection.—Not only does the law require of a gas company that it construct its lines of proper material and in a workmanlike manner, but, after its lines are placed, it is expected to maintain an adequate system of inspection to prevent, to a reasonable extent, accidents that may result from the leakage of gas. It is not, of course, bound to forestall every accident of this kind. The rule is not so harsh that a gas company is required to maintain a line of sentries along its mains to see that no trespasser interferes with them. The company meets its legal obligations in this regard when it maintains a reasonable supervision over its lines and takes ordinarily prudent measures to prevent loss to others through the explosion of the commodity which it manufactures. No exact rule can be stated which will express in precise terms the duty of a gas company in this respect. The rule can be best explained and defined by reference to the cases in which it has been applied by the courts.

In other words, a gas company must use due and reasonable care in the inspection of its pipes, and must repair defects in them, whether caused by its own default or not. When a defect in a gas pipe is caused, not by the negligence of the gas company, but by the act of a third party, and when the gas company has used due care in inspecting its pipes to discover defects therein, it is allowed a reasonable time, after receiving notice of a break or other defect, in which to make repairs. When it receives notice of a defect, which may permit the escape and accumulation of gas, to the injury of persons or property, it must, as soon as practicable, by the use of due promptitude and diligence, secure its gas, either by cutting off the flow or repairing the break, so as to guard against injurious consequences. To accomplish this end the company must use a degree of care commensurate with the danger which it is its duty to avoid. If it fails to exercise this degree of care, and injury results from such negligence, the company is liable, if the person injured is free from fault contributing to the injury.—Pine Bluff Water & Light Company *v.* Schneider; 62 Ark., 109, 34 S. W. Reports, 547.

In "Koelsch *v.* The Philadelphia Company;" 152 Pa., 355, 25 Attorney Reports, 522, it was said: "While no absolute standard of duty in dealing with such agencies can be prescribed, it is safe to say in general terms that every reasonable precaution suggested by experience and the known dangers of the subject ought to be taken. This would require in the case of a gas company not only that its pipes and fittings should be of such material and workmanship, and laid in the ground with such skill and care, as to provide against the escape of gas therefrom when new, but that such system of inspection should be maintained as would insure reasonable promptness in the detection of all leaks that might occur from the deterioration of the material of the pipes, or from any other cause within the circumspection of men of ordinary skill in the business. It requires nothing unreasonable; it does not require that the company shall keep up a constant inspection all along its lines without reference to the existence or non-existence of probable cause for the occurrence of leaks or escape of gas."

Company Not Bound to Provide Against Every Contingency.—"McKenna *v.* Bridgewater Gas Company," 193 Pa., 633, was a case in which a natural gas company was sued for the results of an explosion which caused the death of the plaintiff's wife. It appeared that the superintendent of another company, an expert workman, in an effort to supply the urgent need of some of its customers, searched for one of its own lines and, believing that he had found it, pried open with expert tools a box containing a by-pass of the defendant

company. This connected the defendant's high and low pressure lines, leaving the gas uncontrolled by the regulator, and thus causing the death complained of. It was held that the company was free from liability.

On the question of the defendant's duty to inspect its lines the court said: "Unless the defendant failed in some duty it owed to McKenna as a patron, it cannot be answerable to him for negligence. It undoubtedly owed to him the duty of care in the construction of the line through which the gas was conveyed to his house. It was bound to adopt and use those appliances by which it could regulate and keep under control such a volatile and explosive substance, and inclose or protect those appliances so as to render them reasonably secure and ready for use; all this, from the undisputed evidence, the defendant did. It was not bound to maintain a line of sentries the length of its route to keep off trespassers; nor was it bound by personal inspection at frequent intervals during the day to ascertain whether some other gas company had mistaken the defendant's line for its own and tampered with the valves. In what respect, then, did it fail in duty? Where is negligence to be imputed to it? * * * An expert burglar, with the tools of his trade, can enter a house which the ordinary man would find barred against him. Nothing would have been complete protection of this box except a construction as strong as a jail. No such exacting duty was imposed on defendant by any rule of law."

Explosion of Gas Escaping During Construction of Subway.—In "Koplan *v.* Boston Gas Light Company;" 177 Mass., 15. an action to recover damages for a personal injury caused by the explosion of gas in the subway, which was being constructed at the corner of Tremont and Boylston streets, Boston. A number of occupants of buildings near the explosion testified that they had noticed a strong smell of gas in the street and in some of the buildings on the morning of the explosion, and also similar smells, only not so strong, at different times before. No one saw the conditions below the surface of the street immediately before the accident, and no one saw or knew the exact place or cause of the discharge of gas into the chamber beneath the street, or the cause of the ignition of the gas. The engineer and treasurer of the construction company testified to a conversation between himself and the engineer of the defendant gas company in which he recommended that the defendant company have an inspector along the line of work, to be present at all times in case of an emergency, and thus furnish an added element of safety. At the time of this conversation the engineer of the construction company stated that other companies, maintaining pipes and conduits on the line of work, were providing such inspectors. Experts were permitted to testify that pipes, such as those of the defendant, over which electric cars passed, would be affected by electrolysis, although there was nothing in the pipes which certainly showed it. A clerk in the employ of the gas company was called in behalf of the plaintiff, and caused to produce the book of entries of leaks reported to the company. He gave testimony tending to show that all leaks in the vicinity of the explosion, reported within 3 months before the explosion, were promptly repaired. It appeared that he had made from the books of the company, a compilation showing all the leaks along the line of the subway, reported within 5 months prior to the explosion. In all there were 156. This record was read to the jury and they were permitted to consider the question whether, under the circumstances, the company had provided an inadequate system for the protection of the public from the unusual danger of escaping gas, incident to the uncovering and relocation of its pipes in the construction of the subway. Upon all the evidence it was held that the company was liable.

Cases in Which the Company Was Held Liable.—An infant was injured by an explosion of gas in a manhole, which set fire to his clothing and burned him severely, it being claimed that the gas which exploded escaped from the defendant company's main. In order to recover damages it was incumbent upon the plaintiff to establish that the explosion was of gas which escaped from the pipes or mains of the defendant, and that the defendant had not exercised that care and vigilance which the law requires. Although the direct cause of the explosion it was not shown that the smell of escaping gas was noticeable for two weeks prior to the time of the explosion. The defendant company relied for reports of defects in its mains upon its employees who put in the meters, lit street lamps and made various kinds of repairs. Each employee was instructed to report any leak that might be detected by smell or otherwise. Immediately after the explosion it was found that a 3-inch main of the defendant, 100 feet from the scene of the explosion, was broken. As soon as temporary repairs were made, the odor of escaping gas ceased. It was shown that gas escaping from a leak might find its way through the earth and into the street sewers, where it might accumulate and be redily ignited by a spark. It was held that this evidence was sufficient to warrant the jury in finding that the explosion resulted from the negligence of the gas company. "Tiehr *v.* The Consolidated Gas Company;" 51 N. Y. App. Div., 446.

It was admitted, in the case of "Shirey *v.* Consumers Gas Company;" 215 Pa., 400, that the defendant company's gas main broke and that gas escaped from it and found its way into the cellar of the plaintiff's house, there exploding and causing damage. There was some evidence on the part of the plaintiff, given by a policeman, that he had smelled gas in the street in the vicinity a few nights previously. Three witnesses testified that the fractured edges of the gas pipe, when examined after the explosion, showed in part indications of an old fracture. There was a dispute as to what caused the break in the gas main. The defendant maintained that it was due to the undermining of the supporting earth beneath it by a jet of water issuing from a break in the water service pipe. The plaintiff, on the other hand, denied the existence of this break in the water pipe prior to the explosion of the gas, and contended that the leak in the water pipe was the result of the explosion. It was held that, no matter how the leak occurred, the gas company "could not suffer the escape of gas to go on and imperil the plaintiff's and other neighboring properties," and that the company's liability depended upon whether it exercised due care in the maintenance and inspection of its lines. It was left to the jury and the jury decided that the company was responsible.

Hints to Salesman of Industrial Appliances.

By Mr. Paul F. Reichhelm.

In all heating processes it is essential to have an appliance for generating the heat, which enables you to have absolute control over your fire; and especially is this the case where metals are to be treated for various purposes, such as hardening, tempering, annealing, brazing, case hardening, etc. We feel assured that if you will consider the use of gas as fuel, though giving me an opportunity to demonstrate that the proper gas appliance would be most economical and satisfactory for such use, you will certainly agree with me.

Gas has many advantages over other fuels; viz., perfect regulation of the temperature under absolute control—this being governed by air and gas valves at the will of the operator—cleanliness, time saving, and the amount of work which can be done in a specified time. However, above all else are the results obtained.

If you should be interested and will inform our house of the kind, size and approximate quantity of work you wish to do, say per hour or per day, we would be pleased to give you our best judgment in regard to a proper outfit for your purpose, etc.

A gas appliance man should, first of all, tell a prospective customer that gas is not the cheapest fuel, but that the advantages resulting from perfect control of heat will more than compensate for the difference in price over other fuels, especially where precise and delicate operations are performed; and, from the opinions of experts, with my own experience as well, gas has no equal for this class of work.

To become a thorough and competent gas appliance salesman I suggest the following: Gain all the knowledge and experience that you possibly can on the gas appliances that you are seeking to place, learning from this how and when to recommend the proper apparatus. If a customer should in an argument compare his cost of coal with that of gas, we at first blush, all know that, with few exceptions, coal will be the cheaper, but in most cases he forgets to figure the advantages of gas over coal, or other fuels, which are many. For the arguer I would note the following:

Point out that gas saves time and labor. In cleanliness and uniformity of heat (the latter is under perfect control), the quick heats obtained, and the quality and greater quantity of work turned out in a given time, if taken into consideration, ii will invariably pay for itself.

Then try to find out the requirements of your customer, the kind of work he does and how he does it. In recommending gas appliances, do not sell him a large apparatus for the sake of getting a large consumer, but as small an apparatus as will meet his requirements. By this means he will get used to a gas bill, and, if the small appliances are satisfactory, he can be more easily induced to do his larger work with gas, further, in a good many instances he will inquire for larger appliances without solicitation.

When he buys coal he gets something for his money; that is, he gets a big pile of coal stored in the cellar or bin, noting it as gradually being used; whereas, when using gas for fuel, all he sees is the bill and wonders what it is for. He does not see that for which he is paying, and it must be shown to him in the results he obtains.

To get the most economical and best results from gas, you must confine it to the smallest possible space in which the work can be done. A good plan of procedure (one which has been adopted by several of the larger gas companies throughout the United States) is to canvass the city or town thoroughly to get the names and locations of the various manufacturers, ascertaining the kind of work they do, the fuel they use, and for what it is most used, especially with regard to melting, forging, annealing, hardening, tempering, boiling various substances, japanning, etc., noting, if possible, if he is interested in the improvement of some of his heating processes.

It is rarely you will be able to sell an apparatus on your first visit, and I therefore suggest a card system in which you can make the above named notes and systematize them by routeing. Then go over this route, say once or twice a month. By following a procedure of this kind, you do not tire a prospective customer, and it also gives him time to think over matters between your visits.

After going over a territory the first time, lay out a regular route, and go over it again from beginning to end, In the course of a short time you will gain considerable knowledge of the manufacturers and the kinds of work they do. These two points are important, since, by getting acquainted with the manufacturers and their work, you qualify yourself to recommend a proper outfit. Getting acquainted with the superintendents and foremen is specially important, so that you may have a chance to learn their needs, and can explain your appliances thoroughly to the men who must use them. It takes time to locate the different manufacturers to get necessary data upon which to work; but it is time well spent, and the proper returns for conscientious and systematic work will compensate for the trouble. I could take quite some time upon this subject, but I have given you the result of my experience during 5 years' service connected with gas companies and a number of years as an apprentice and worker in gas appliances, both in the factory where they are made, selling them and installing them in several hundred shops where they are used for a great variety of work requiring proper heat treatment.

Address of the President of the Southern Gas Association (Mr. H. W. Frund. Chattanooga, Tenn) on the Occasion of its Third Annual Meeting.

With the utmost pleasure at the opening of this, the third annual meeting of the Southern Gas Association, I extend to all a most hearty welcome to the Capital of Alabama; first Capital of the Confederacy; the metropolis of Central Alabama, a beautiful city; one of the chief cotton markets of the world with 8 railroads and waterways; a trade center of a population of over 1,000,000 successfully engaged in 163 lines of manufacture, with natural resources in the way of raw materials which have hardly been touched. Montgomery is noted for its beautiful avenues, its excellent artesian water supply. Beautifully situated on a high bluff of the Alabama river, a water way furnishing broad and deep navigation to the Gulf, it is here where Jefferson Davis took the oath of office as President of the Confederacy, February 18th, 1861; and it is here we welcome you.

I trust this convention will develop results and be of even greater interest to our membership than any which preceded it. I would, however, expressly disclaim responsibility for such happy results, but on the contrary place the credit for it where it is due, with our worthy and esteemed Secretary, the respective committeemen, and the Editors of the Question and Wrinkle Departments of your Association.

The Committee on Papers has considered the recommendations made at the last convention, and has secured a programme I would say that will cover matters of extreme interest to our members, both active and associate; and, unless, some of our contributors fail us, we shall cover a wide field of information, both theoretical and practical. I trust that the discussion of the papers presented will be active and searching, as it is in these discussions that the true value of the papers presented is to be found; therefore, do not let your modesty hold you back in these discussions, but add each mite to the value of the "Proceedings" by bringing forward any point which may suggest itself to you.

Apropos on the subject of the value of the papers submitted, discussion thereon, or in general, it has been difficult in past meetings of this, as well as of other Associations, to sufficiently encourage many members to take the floor and bring out matters of which they either had information which the other members would like to hear, or where they desired information and yet did not for some reason care to display their ignorance or had valid reasons for not so doing. I believe this is largely due to fear of being misquoted by the stenographer, and also to the broadcast publication of the discussion. To test this question I recommend this year, for trial only, that we dispense with the services of the stenographer, in so far as the discussions are concerned, to see whether this theory is correct, and whether by so doing we can promote a full and free discussion of all matters and thereby improve our meetings materially.

During the year just passed into history much that was done is of interest to our profession, though no startling discoveries or innovations have been brought forward, if we may except the inverted gas arc, the forging ahead of the gas engine and the progress made in public lighting by gas. Still, the year has witnessed better development of many appliances, until the uses for gas can be applied to more than 800 different purposes other than for lighting or for power.

While every good, loyal man in the gas business is enthusiastic over the work in which he is engaged, there is the question of prime importance of how to further develop our industry with the talent which already exists. There is no other investment a gas company can make which will be more profitable to it than to arouse vital, intelligent and active interest in the progress of our industry in the minds of the young men it employs. The question of prime importance is how to develop in our industry the talent which already exists. There is not a gas organization in this country, large or small, which does not possess in its ranks young men of ability, who, if given opportunity and encouragement to develop a better knowledge of manufacture, distribution and sale of gas, would make good use of that opportunity, with enormous resultant benefit to the companies with which they are connected. I ask you to take the above facts home to you, look over your employees carefully, seek out those who give promise of being able to bear the burdens of the future which must soon fall upon them, begin their development at once by giving them a membership in an educational institution which will arouse in them the desire to become an integral factor in the upbuilding of your company.

Vexatious questions are brought up almost daily by municipal authorities, who, in the granting of new franchises, insist in fixing the candle power of gas, with the result that there are now two standards, thermal and illuminating, when there should only be one. The public requires and demands more light. The old, open-flame burner is obsolete, a thing of the past, and the illuminating standard should be eliminated. In a late paper Mr. Bradley put great stress, and well so, upon the proposed change of the standard of value as applied to the manufacture and use of artificial gas, and this is an important question, perhaps the most important one in its influence upon the entire industry—the adoption of a calorific or thermal standard of value to take the place of the present photometric or candle power standard. A calorific standard has already been adopted in some States, and is being considered in New York as well as in other States. It has also been adopted, to some extent, in some of the larger installations in Europe. The advocates of this change argue that, as gas is so largely used for obtaining heat and power and for lighting purposes with the incandescent mantle burner, the thermal value is of more importance to the consumer than is the illuminating value. If this is conceded, it logically follows that, in every case where the thermal standard is adopted, the illuminating standard should be eliminated. This Association should place itself on record on this question, as any attempt to enforce compliance with two standards of manufacture, in the present state of the art, would simply result in our being penalized for non-compliance with one, while entirely in compliance with the other. This in itself is a sufficient argument for a single standard and for the Association to take cognizance of this important question and act accordingly.

The socialistic tendencies of the times are becoming more apparent day-by day, until there must be an awakening to the furthering of some measures taken to protect our interests. The gas business is perfectly legitimate, and the general public, while appreciating the vast good accomplished for their welfare and convenience which is being had by the aggregate savings of many people, invested on a legitimate plan, fail to realize that to leave the field of publicity to the muckraker and the agitator, they are favoring laws smacking of

confiscation which are hindering the progress of a public service corporation to such an extent as to react upon them with disastrous effect, financially and otherwise.

The national government has placed laws on the statute books having for their object the regulation and supervision of corporations, especially those corporations classed as public utility corporations, in which class, among others, gas companies are included. The lead of the Federal government was followed by the legislative bodies of several States, with the result that many laws were enacted, more or less drastic in character, according to the temper of the legislative bodies at the time, and the demands of so-called public opinion.

It is conceded by those who are familiar with this question that the fault of enacting vicious laws by legislative bodies does not wholly lie with its members, but with the public service companies now being organized, bringing up the issues squarely, and enlightening the lawmakers on the other side of the question. Many laws are enacted and put in force before the officers of the companies are made aware of the passage of any laws affecting their companies' interests.

For the time being only, in every State coming under the jurisdiction of this Association, there should be a committee appointed whose duty should be to inform the members of the Association of all proceedings in the respective legislatures or elsewhere affecting the rights, powers, privileges and property of gas companies, and take such proceedings as may be necessary to secure joint action for the protection of the same. It is most urgent that there be some action taken to protect invested interests, and recommend that all gas companies organize a "Gas Companies' Protection Association," on the lines of like associations now doing effective work in Europe.

The expense of an organization of this kind will be merely nominal and results very great. Furthermore, with a well organized staff members could consult with the proper officer on points such as appertain to deductions from Federal tax for depreciation of plant, machinery, gasholders, etc.; right of a gas company to restrain, by injunction, a local authority from using steam roller in such a way as to cause injury to gas mains; invasion of a gas company's area of supply by another gas company; mode of tax assessment; points as to recovery of gas and meter rents and as to proof of correct registration of meters; rights of gas company to claim damage to mains; right to charge consumer with cost of substituting ordinary meter for slot meter; amount of security to be given by intending consumer; liability of consumer for money stolen from meter; and other questions that may come up from time to time. I trust at the proper time the committee passing on this address will submit to you recommendations for the formation of a protective association which is so much needed. Relative to the hygienic values of gas, it is a well known fact that the average, old-time medical practitioner, and many of the new doctors, are very much opposed to gas heating in the sick room, and often to any extent at all in the house, on account of the so-called vitiation of the atmosphere.

The "Journal" of the Royal Sanitary Institute gives a report by Dr. Samuel Rideal on what is perhaps the most exhaustive, complete and scientific series of tests ever reported. As this question is of great importance to the gas companies throughout the South, where the matters of extra heating and gas lighting and the wonderful field of gas in heating mean so much to our business, I think this question is worthy of consideration, and recommend that we collect, from undisputed authority in the medical and ventilating professional field, data for circulation, setting forth its merits as a positive gain in ventilation.

Report of Committee Appointed to Consider and Report Upon President Frund's Address.

The following is the text of the report on the address of President Frund's, to the Southern Gas Association, as submitted by the Committee appointed to consider the same:

We, the Committee appointed to consider the President's Address, beg leave to report as follows:

The President is to be congratulated on his most excellent address. It contains much food for good thought, and gives us some valuable and timely advice on the several phases of our profession in such convincing diction that we cannot but profit by it. We most heartily recommend it to the further careful study of all the members.

Gentlemen, in making this report we want your earnest attention. Too many of us regard the President's address as the mere formal opening of our convention, wherein a mass of glittering generalities is more or less expatiated on, containing no matter of real imminent interest to us; likewise we adopt the report on same, as the usual complimentary acceptance and general commendation to all.

This attitude is wrong. His address is the most pertinent paper of the proceedings, and naturally so, for the reason that the President is selected as our leader on account of his special ability in the profession and general fitness to be our executive. It is an honorary position, coming but once; and it is his opportunity then to contribute the essence of his very best thought and advice, as he sees, to our business society. His recommendations are, therefore, the results of searching investigation of the requirements our general interests demands. He has had an entire year for preparation, so it is but natural that his address will be a most worthy climax to his office. That is particularly true of this address. The several recommendations are especially pertinent to the best interests of our Association, and we feel incapable, with the short time at our disposal, to make the impressive endorsements to which they are entitled, but will try to cover below his following points:

1 Discussion of papers; 2, quality standard; 3, legislation; 4, gas hygiene.

For the reasons above stated we herewith make the recommendation that the executive committee hereafter constitute the Committee on President's Address, they to receive copies of same two weeks prior to meeting, and make their report to the Association the first matter of business of the second day's session. Thereby will his recommendations be presented for consideration by the members in real session, and such action be assured as our Association demands. The President will then feel repaid for his efforts in our behalf.

The present status of appointing a committee, subsequent to the reading of the address, to report on same, means that this work must be done in a hurried manner, and its reading at the adjourning session is altogether inadequate and unworthy of the purpose, which if continued will impair the originality and special endeavor for excelence in the address, and destroy desire for presenting special recommendations for our action.

1. As to his suggestion that the disposal of a stenographer in recording discussions might engender a more liberal discussion, because of the fear of being misquoted. In this connection it is to be pointed out that these discussions are always open for correction before going into print, and as this department of our deliberation is often as important as the paper itself, it should be maintained. With further reference to matter of discussion, we would call your attention to the plan adopted at this meeting wherein several previously prepared discussions by our various members were offered immediately following the paper. This eliminated the often awkward pauses and immaterial remarks that sometimes follow where discussion is entirely of extemporaneous character. These well-directed, voluntary discussions induced a more liberal general discussion by the members at large, and greatly improved the quality of same in many ways. The leaders of discussion act as monitors in bringing out the thoughts of others whom they know to be particularly well versed on the subject, and at the same time prevent too wide a digression from the subject at hand. We commend the continuance of this practice at our future meetings.

2. As regards going on record in favor of the one standard of quality; namely, the thermal. This is well taken, and we suggest that the Association make this endorsement at the same time that our several other Associations do so.

3. Regarding the matter of appointing committees in each State, to advise with our legislative bodies with a view of educating them to proper appreciation of our rights and endeavor to divert adverse pernicious action by them, would say that this is a most wise suggestion. We feel, however, that the work involved is such a task that it would be too great to come within the instruction of our society, and must, therefore, be arranged for independent of same. In this connection we would call your attention to an organization known as the Alabama Light and Traction Association, which is composed of several gas, electric and street railway properties of that State, initially and sspecially for the purpose of caring for this adverse legislation question, member companies being assessed dues based on their gross earnings. They employ all legal aid necessary to handle the matters of general influence. That Association has a constitution somewhat like our own, and holds an annual meeting at which matters of general interest to all concerned are discussed. Information regarding the operation of same can be secured by you from any of

the member companies. We would recommend the forming of a similar organization in each of our States.

4. In conclusion, we wish to call your attention especially to the President's recommendations as to the need for more data regarding the great hygienic advantages of gas where used for illuminating and heating purposes.

Gentlemen, this, to our minds, is the most important reference in his entire address. The majority of us engaged in the business are not awake to the fact in all its truth of the real, genuine benefit to hygiene secured by the use of gas, and this matter has never before been properly emphasized by us. We are losing the best weapon in our campaign for business by not educating the public to these hygienic advantages.

We all know in a general way that incandescent gas lighting is less harmful to the eyes than other artificial light. We know also that the heat produced by the use of gas light or gas heaters induces positive, pronounced air currents, which circulation aids greatly in the general ventilation of the room; but we do not know just how real and to what extent these advantages result over other methods of doing the same work. A great deal is being done in the matter of research work to bring out these points by the medical profe sion. We, therefore, most enthusiastically indorse the President's recommendation of a committee to be appointed to make a report on this matter in its several phases, which will gain its knowledge by actual tests and rigid study of the best authorities on these points. This report should be complete, but terse, in order that it may be used as a treatise which will command attention of the professions interested—that is, architectural, ventilating and medical, and should at the same time be convincing to the public. All of our heating and lighting appliance manufacturers should be furnished copies of this report, and urged to give fitting extracts of same in all of their advertising.

We also urge that report, as submitted by this Committee, be indorsed by the American Gas Institute and the National Commercial Gas Association. The value of this report will be augmented one hundred fold by indorsement of the National Association of Ventilating Engineers, as well as our several more important medical organizations, and this should be accomplished.

We respectfully suggest that, in appointing this Committee, special care should be observed in selecting such gas men as have made a study of this question and those who are in position to carry out the tests. It would also be well to have one representative each from the most prominent lighting and heating appliance manufacturers on it.

Respectfully submitted, A. F. KEARSTING, Chairman.
E. M. OSBOURNE.
A. D. WHITTAKER.

An Investigation of the Steam Consumption in Water Gas Plants of Moderate Size.

[A paper read by MR. L. B. MOORHOUSE, Engineer, Gas Division, San Antonio Gas and Electric Company, before the Southwestern Electrical, Gas, etc., Association.]

There are few pieces of apparatus used in the manufacture of gas which do not use steam, yet in the ordinary plant its economic utilization is sometimes sadly neglected. The boiler equipment is, as a rule, made large enough in the beginning to more than cover all needs, and it is not until the demand on it commences to overtax its capacity that the plant operator commences to imagine that there may be something wrong.

An investigation of conditions will usually disclose the fact that there is an unnecessary waste in one or more places. The steam requirements of a plant of 1,000,000 feet capacity per day of 20 hours, or 50,000 feet per hour in a plant of ordinary design, will be about as follows:

Generator.—Thirty pounds of steam per 1,000, or 1,500 pounds of steam per hour; with a boiler pressure of 100 pounds, and feed water temperature of 180°. This will mean 45.4 B.H.P.

Blower Engine.—The blower for a generator having a capacity of 50,000 feet of gas per hour will be required to deliver about 6,000 cubic feet of air per minute.

The theoretical horse power for delivering this amount of air at, say, 20-inch pressure at the blower outlet, will be:

$$\text{H. P.} = \frac{20 \times 5.2 \times 6{,}000}{33{,}000} = 20.75.$$

Assuming a mechanical efficiency of 50 per cent. for the blower, and a mechanical efficiency of 85 per cent. for the engine and a line shaft, our engine must furnish 48.8-I.H.P.

Using a slide-valve engine of the automatic or throttling type, such as are generally found in use in the average plant, we may expect, with the scant attention which they get, and with the peculiar load condition which the alternate blast and runs of the gas generator subject them, a steam consumption per I.H.P. of about 60 pounds.

If the blasts are of 5 minutes and the runs of 6 minutes duration, then the B.H.P. required will be:

$$\frac{48.8 \times 60}{34.5} \times \frac{5}{11} \text{ or } 38.6.$$

Exhauster.—To pump 50,000 feet of gas per hour against a net head of 15 inches of water, our exhauster will be working theoretically at 1.97 horse power.

$$\text{H. P.} = \frac{6\frac{2}{3}^{.5} \times \text{V. H.}}{33{,}000}$$

where V is volume of gas pumped in cubic feet, and H is the net head in inches of water pumped against.

$$\text{H. P.} = \frac{5.2 \times 50{,}000 \times 15}{33{,}000} = 1.97.$$

The exhauster and engine will, according to Mr. Geo. J. Roberts, in all probability not have a mechanical efficiency of more than 50 per cent. This figure, for small plants, is probably too high, and it is more than likely that 35 per cent. is nearer correct. The engine operating the exhauster will be of a slide-valve type, and will use 60 pounds of steam per I. H. P. The B.H.P. necessary will thus be:

$$\frac{1.97 \times 60}{.35 \times 34\frac{1}{2}} = 9.8.$$

Pumps.—Our pumps will be of the duplex-piston type, with a mechanical efficiency as low as 65 per cent. and a steam consumption of 150 pounds of steam per I. H. P.

According to a paper[1] on "Power Plants for Gas Works," appearing in the "Proceedings" of the American Gas Institute (1910), the total steam for pumps about the plant will be about 16.8 pounds per 1,000 feet made. Thus for an hourly make of 50,000 pounds our requirements will be 14.5 B. H. P.

The total boiler horse power to be supplied will be 108, to which we may add 10 per cent. for leakage and condensation, and to this again another 5 per cent. for boiler feed pump requirements, making the total about 125 B. H. P. Should the boiler be fed by an oil burner, we may safely add 5 per cent. more for injection of the oil. A boiler of 125-horse power size is sufficiently large to handle a plant of the capacity mentioned, for it will stand 25 per cent. overload easily; indeed, many engineers claim best economy on 50 per cent. overload. However, the boiler should be duplicated to permit proper inspection and repairs.

An attempt will now be made to indicate how to obtain a record of the steam consumption of the various pieces of apparatus and what steps may be taken to remedy conditions where steam consumption is found to be excessive.

The coal and oil results of the gas set are of first consideration, and to get these we must have the blast and run properly proportioned as to time and intensity. When the operator has determined what blast pressure he needs to get the best results from his fuel it should be the aim to supply that pressure with a slight reserve in case the fires get fouled. An excess of blast pressure over the needs puts extra work on the blower with a consequent waste of steam, for the horse power required to drive a blower varies as the 3/2 power of the pressure. Similarly, too, long blast not only burns up an unnecessary amount of generator fuel, but it also uses up steam at the blower end. Too long a run not only passes into the gas an undue amount of C O, and cools the fuel bed, but it also passes through the set a lot of undecomposed steam. It is to no purpose to keep the run and blast periods constant and the blast pressure and steam pressure below the fuel bed constant, if the resistance of the fuel bed varies, and it is with this in view that present day engineers in our larger companies have inserted devices in both the blast and steam supplies to give a constant flow. These devices depend on the maintenance of a constant differential pressure between the 2 sides of a constriction in the pipe. It is evident that these devices must not alone result in a saving of coal and oil, but likewise a saving of air and steam.

1 "Power Plants for Gas Works of Medium Size," by C. D. Robison; Am. Gas Inst., 4th Meeting, Detroit, 1909. See JOURNAL, April 4, 1910; p. 628.

The pipes conducting the steam to the generator should either drain to a steam trap or back to the boiler. Wet steam works to the detriment of economy in the generator, if the per cent. is above a certain amount. Steam expanding from 100 pounds pressure to atmospheric pressure may be as high as 4.35 per cent. in moisture, and yet dry when it is expanded, hence, it is safe to say that ordinary steam as it enters the generator is at least saturated and may be superheated, yet there is apt to be an accumulation of condensation in the pipes between runs, if the pipe from the boiler is long. This will be blown into the generator and will remain there to be evaporated during the blast. Hence, the value of a steam separator at the generator, where but one generator is supplied from a long steam main.

It will be worth while to know what the quality of steam at the generator is. This may be easily determined by a steam calorimeter, if one is accessible. A determination of the amount of steam used on a gas generator might be made by a steam meter, but as small plants would not be likely to install a device of this sort, probably the best method would be to run one boiler on the generator and supply the rest of the plant from the remaining boiler. The feed water should be weighed and the pounds of steam used per 1,000 calculated.

Another method which could be used is to observe the pressure on the inlet to the steam spray and the pressure at the outlet; *i. e.*, the pressure under the grate. Then, when the plant is idle, close all openings on the generator and duplicate the inlet and outlet pressures on the steam spray by properly adjusting the steam valve and slightly opening the charging door. Weigh the feed on the boiler, which must of course be used only to supply steam for the test, for a 2 to 4 hour run. Correction should be made for the feed pump, but if an injector be used this correction may be omitted. The feed water per minute will be the rate of flow of steam through the spray. The blast pipe from the engine to the generator may be too small, or may be made up with sharp bends or tees, and thus necessitate a large drop in the pressure and a consequent extra load on the engine. The drop should not exceed $\frac{1}{8}$-inch water per 100 feet of piping, or its equivalent of fittings.

A thorough examination of the blower engine should be made. First, it should be tested for its steam consumption, by weighing the feed water on the boiler supplying the same. It should be indicated and its indicated horse power figured from the diagrams, and also the steam consumption per I. H. P. calculated. The difference between the steam per I. H. P. taken from the card and the actual evaporation per I. H. P. should be noted, for this difference represents the loss in leakage in the valves and in cylinder condensation. This figure, for throttling and automatic high speed engines, may be enormous. It will seldom be less than 20 per cent., and is apt to run as high as 100. If the card is not good, its evils should be corrected and a new steam consumption test made.

If the sizes of the pulleys used are not properly chosen, the engine may be pulling its load and yet working uneconomically because of a too early or too late cut-off, depending on whether it is running too fast or too slow. The cut-off of a simple engine should be about $\frac{1}{4}$ to give the most economic results. A too early cut-off increases cylinder condensation, and a too late cut-off results in incomplete expansion. If the valves of the engine are not correctly set, or if the cylinder on examination shows much wear, the valves should be reset or the cylinder re-bored. Likewise, if the valves do not make a good seat over the ports, then they should be re-faced.

Ordinary, simple engines, which one will find in gas plants, are apt to be poorly designed, but when in proper condition they should not use more than 35 or 40 pounds of dry steam per I.H.P.; yet, as stated at the beginning of this paper. it will usually be found to be consuming near to 60 pounds.

The exhauster engine may be investigated along the same lines as the blower engine; but, it being a small unit in comparison, it is not reasonable to expect as good economy. Indeed, if it be an old exhauster, badly worn and poorly lined up, the mechanical efficiency of the combination is apt to be exceedingly low, and as a result from this the engine will be overloaded and the steam consumption very high.

The size of the steam pumps about a plant will be too small to allow them to be tested individually for steam consumption by weighing the boiler feed; yet we may easily obtain the steam consumption on these pumps by condensing and collecting the exhaust in a condenser made of a coil of pipe surrounded by cooling water. An improvement may be effected by the selection of the right size for the work required and careful maintenance of the stuffing boxes and the packing rings and valves on both the water and steam ends. The water valves must not only be kept in condition, but the springs should be kept at the right tension, or either leakage or undue friction will result. Pumps having a stroke of 12 inches or over should not run over 100 strokes per minute, and pumps of 5 inches or less not over 200 strokes.

The steam pipe should be ample to deliver the steam to the engines with a drop of not over 4 pounds per 100 feet; but for the gas generator this is not so important. In fact, most economic results will be obtained by having this pipe just big enough to supply the demand of the generator, for it is the weight of the steam we require and not its energy, and there is no appreciable difference in the heat of steam at 100 pounds pressure and that at atmospheric pressure, this amount being slightly over 2 per cent. Furthermore, a small pipe with a greater velocity of flow gives less radiation per pound of steam transported than a large one. On the other hand, the future needs of the plant should be anticipated in the selection of the piping.

It is highly important that all the piping about a plant should be insulated and the insulation kept in repair. When steam lines are run underground they should, if used much, be given a special wood covering, and should be provided with a valve inside the building, which valve should be closed at all times when the steam is not in use.

Boiler Economy and the Application of Flue Gas Analysis.

[A paper read by Mr. M. L. Hibbard, Engineer, San Antonio Gas and Electric Light Company, beforc the Southwestern Electrical, Gas, etc., Association.]

That greater efficiency can be obtained in steam plants by means of flue gas analysis and its application have, during the past few years, been forcibly brought to the attention of those responsible for results. Considerable interest has been manifested by the larger companies, and this subject is now being given more attention by the smaller ones.

The chief source of waste (that is, unnecessary waste) in the operation of the average boiler plant is in one of two things—too much air supplied to the furnaces, or probably in a few cases, too little. with more air than is required for the combustion of the fuel, the energy lost is greater than it should be by an amount proportioned to the weight of this excess air and its elevation in temperature from that of the boiler room to that of the stack. With insufficient air we are producing a certain amount of carbon monoxide, and since 1 pound of carbon burned to carbon dioxide (CO_2) represents the evolution of 14,600 heat units, as compared with 4,450 heat units when burned to carbon monoxide (CO), the difference (namely, 10,150 B.T.U.) will be carried up the stack. With a throttling of the air supply and the production of CO, the operation of the furnace is carried on after the fashion of a producer gas generator. CO may also be produced by incomplete mixture of the furnace gases or the lack of a temperature sufficiently high to cause its combustion.

A pound of pure carbon requires for its complete combustion 2.66 pounds of oxygen (O). The average proportion of oxygen in each pound of air is .23 pounds; hence, for the complete combustion of 1 pound of carbon, we will require $\frac{2.66}{\text{m}23}$, or 11.56 pounds of air. The CO_2, formed as the product of combustion, will weigh as much as the carbon and oxygen before they combined, or 3.66 pounds. The weight of nitrogen, the other constituent of air, will remain the same, namely, 77 per cent. of 11.56, or 8.90 pounds, and the total weight of the gases will, therefore, be 12.56 pounds.

The mean proportions of oxygen and nitrogen in air by volume are 20.96 per cent. of oxygen and 79.04 per cent. of nitrogen. The volume of CO_2 formed by the combination of carbon and oxygen is exactly equal to that of the oxygen so used. Hence, as a result of the combustion of 1 pound of carbon furnished with exactly the right quantity of air, no more or less, the gaseous products of combustion would have 29.96 per cent. of their volume, composed of CO_2 and the remaining 79.04 per cent. of nitrogen.

We will assume that the fuel is pure carbon and that, instead of supplying 11.56 pounds of air per pound of fuel, we furnish twice that amount. Each pound of carbon will still unite with 2.66 pounds of oxygen and form 3.66 pounds of CO_2, having the same volume in cubic feet as it did before, but the volume of CO_2 relatively to the

(*Continued on page* 74.)

THE AMERICAN GAS LIGHT JOURNAL

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

A. M. CALLENDER & CO., - - Proprietors.

THOMAS J. CUNNINGHAM, ELBERT P. CALLENDER, } Editors.

H. THURSTON OWENS. - Associate.

CHARLES H. WADELTON, Manager.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, JULY 31, 1911.

[Official Notice.]

Experience Department, Pacific Coast Gas Association.

Pacific Coast Gas Association, Office of Experience Editor, San Jose, Cal., June 24, 1911.

To the Members: The Nineteenth Annual Convention of the Pacific Coast Gas Association will be held in Oakland, September 19, 20 and 21. The Experience Editor of the Association is in despair. Cast him a line; come to his rescue, for he needs help. To the notices sent out by the Secretary, few have replied.

We know that every gas man has had at least one experience during the last year that would be of interest to us all. Will you kindly respond at once? We know you are busy; gas men always are. And busy men have many experiences worth telling.

Sincerely yours, John D. Kuster,
48 E. San Antonio street. Experience Editor.

BRIEFLY TOLD.

Selling Gas Lighting Service.—Mantle or incandescent burners have been introduced to such an extent as to be almost representative of gas lighting, despite the fact that only small percentages of these reach the consumers through the gas companies. This means that the major number of the public using gas for lighting buys gas from the gas company and buys lamps, mantles and accessories from the small tradesmen or the pedler. It is not service that is purchased. When the prior open flame burners were in vogue they almost bought service, as these burners required only little attention; but with the advent of the more delicate appliance, the mantle burner, consumers ceased to buy service save in occasional instances. That they should be able to buy service is best exemplified in the successful methods used by the large companies that are selling street lighting service by means of gas throughout the country. They will not sell an appliance. Another instance is that of the telephone industry, whose directors will not sell an appliance; they sell service. Selling service means maintenance, and maintenance is the high road toward satisfied consumers.—Lumino.

Furnace Conditions and Efficient Use of Fuel.—The Director informs us that the Bureau of Mines, Washington, D. C., in connection with its investigations bearing upon the improvement of furnace conditions and on efficiency in the use of fuel, has just issued a bulletin describing the apparatus and methods in use for the sampling and analysis of furnace gases. The authors (Messrs. J. C. W. Frazer and E. J. Hoffman) say in their introduction: "The furnace conditions prevailing, both in small plants and in large industrial establishments, in this country, are frequently far from satisfactory, and if such conditions are to be improved, they must be more thoroughly understood, hence means must be found to insure complete combustion of the fuel, and yet to permit operation with such an excess of air as will result in the greatest efficiency. In this work the services of the chemist are indispensable. A very important problem is the determination of the small percentage of unburned combustible matter that escapes from the furnace in the flue gas. Under ordinary circumstances so little as 0.1 per cent. of unburned combustible matter in a furnace gas is equivalent to about 1 per cent. of the fuel used; and for the determination of such small percentage of gas more accurate and refined methods are required than have heretofore ordinarily been available." The Bulletin (No. 12) may be obtained by an inquiry directed to the Director of the Bureau of Mines, Washington, D. C.

High Pressure Gas Distribution System at Guadalajara, Mexico.—This from Mr. W. A. Aldrich (and may he ever prosper), explains itself: Dear Journal.—In planning the gas distribution system at Guadalajara, the writer aimed to carry out in a practical form the emblem of the Pacific Coast Gas Association, a distribution system without "dead end." Let me preface this by saying that the common fuel used in Guadalajara for 400 years is charcoal. There are no fire grates in the houses of either the rich or poor, and there are no fire engine stations. In fact the latter would be of little use for the houses are made of adobe brick; the ceilings are of brick and the floors are of tile. Absolutely no lumber is used in the construction of a store or residence, except that in the doors and window sashes. If a gallon of ignited gasoline were spilled over the contents of a room it would burn itself out without damage to the walls or ceilings. It may be said that the city is fireproof.

The "Mozo" (servant) problem does not exist, as they are plentiful, the only trouble being that Americans living there find it very difficult to teach the Mexican servant how to cook "American." In some of the richest families—and there are a great number—American ranges are in use, but the ovens are employed for drying the wood used in the stoves. They do not understand that it may be used for cooking. The common cooking appliance is the "Brasero," the top of which stands as high as an ordinary gas range. In the better class of houses the braseros extend the whole length of the kitchen and contain as many as 10 or 12 openings. Charcoal is placed on a small grate (similar to the top grate of a hot plate) placed at the bottom of the brasero on the top of one or two pieces of pitch-pine. The fire is then fanned until the charcoal ignites, when it will burn for hours providing it is kept replenished. The charcoal is brought in on burros' backs, and sold for 2 to 2½ cents per pound, Mexican money. In the better class of houses hot water coils of ¾-pipe form the grate at the bottom of the brasero, and it takes several hours to heat sufficient water for a bath. Can it be wondered at that, although gas was an absolutely unknown quantity, the people welcomed the advent of anything which would relieve them from using charcoal, and in such primitive appliances. The fact is sufficiently demonstrated when the writer states that more than $20,000 worth of appliances were sold by the time the writer left there, two-thirds of which were sold from catalogues alone; but that is another story.

The original intention was to form the distribution system into loops, supplied from one main feeder. In the paved district there are about 20 kilometers of asphalt-paved streets. Inquiries as to repairs to asphalt after the pipe was laid, and for laterals as services, demonstrated that it would be too great a luxury, so it was decided that the main should be laid on the outside of the sidewalks on each side of the street. This would obviate cutting the asphalt either for mains or services, save at the intersections of streets. It would also reduce the danger of electrolysis in running services under tracks. When an intersection of street was reached a pipe-pusher was used wherever possible, and in changing our plan to conform to the new conditions many thousands dollars were saved. The system followed was as follows: Commencing from the outlet of the double high pressure regulator at the plant, 3-inch steel line pipe, with recessed threads and couplings, was used. The pipe was prepared in the following manner: The pipe was thoroughly hammered to remove scale; and, let me say in parenthesis, this is one of the most important factors, that if done in a careless or perfunctory manner meant untold trouble after the plant is in operation, particles of dirt and scale getting into the seat of the regulator, causing the seals to blow with the consequent loss of gas, to say nothing of the nuisance to the consumer. After the hammering process, sacking is split into strips shaped in the form of a lamp glass cleaner, and pushed through the pipe. The couplings are then reversed, and the pipe is painted with a preservative used with great success by the writer for many years. When dry, which takes about 2 hours, the pipe is then strung out on the opposite side of the street where it is to be used. Just previous

to laying, the "swab" is again brought into use and the male end of the thread is "doped." This work is performed ahead of the pipe gang. The line extends north for about 2,000 feet; thence west 8 blocks; thence north 14 blocks; thence east 16 blocks; thence south 14 blocks; thence 8 blocks west to the point of divergence from the main feeder.

This main loop covers the downtown district. From East to West (North to South within the loop) a 1½-inch pipe is laid on each side of the street, on the sidewalk, without a fitting except Dresser insulator couplings. At the intersection of the streets the pipe runs under that going North and South and over going East and West.

Preparatory to laying the main the owners or occupiers were canvassed for permission to put in a service free of charge. We received a large number of permits. The length of pipe necessary for services averaged 8 feet. The object in putting in these services as we went along was to obviate the necessity of breaking the sidewalk when in the future gas was required. As many withheld their orders for it until they saw what gas was like, it will be seen that a very large saving was made in repairs, as 60 per cent. of the services laid are now in use.

The paving outside the downtown district is mostly cobblestone and macadam. From the main loop other loops were formed of 2-inch pipe, of course laid on one side of the street furthest from the car tracks which, it may be stated, run through one side of the street only. As the streets are too narrow to permit of double tracks, the cars go out one street, returning by another to the terminus. This 2-inch loop is connected to the 3-inch loop at each corner of the rectangle and valves are placed so that extensions may be made at any time without shutting off the supply. Owing to the irregularity of some of the downtown blocks outside the 3-inch loop, several runs of 1¼-inch pipe were made up, but always tied in to a feeder.

There is one drip in the system, about 1,200 feet from the plant; not that it is necessary. Blow-offs are placed at certain locations to take care of any condensation that carelessness at the plant may occasion. The system is divided into districts so that all or any part thereof can be shut off in case of necessity. Galvanized pipe and fittings (beaded) are used for service, with individual Reynolds mercury regulators. The present pressure at the outlet of the double high pressure at plant is 4 pounds, which was the pressure shown on a Bristol-recording gauge at the remotest distance from the plant. Tests made at different pressures throughout the system showed uniform regardless of distance. There is not one dead end in the system, and high pressure distribution is having a test in Guadalajara as nowhere else, for not only are the people ignorant of the use of gas, but they would not know what to do did a regulator valve seat stick and the gas began to whistle. However, the plant has now been in operation nearly 3 months with not one complaint. It will necessitate a long, persistent, educational campaign, which is now being carried on by means of a monthly magazine, the second number of which has been issued.

It should have been stated that many objections were made to the modern gas range by the Mexicans, who stated their cooks could not be made to manipulate the ovens. This difficulty was gotten over by fitting up the braseros with pipe; taking the bottom grate out of the brasero where the pipe is brought up, and an ordinary ring burner, used generally as top burners, substituted.

The manner of handling consumers is a very delicate operation, owing to the extreme sensitiveness of the average Mexican. They are an extremely courteous people; even the very poor class of "Peon" will raise his "sombrero" to a passing acquaintance; women and men alike never meet or part without a formal handshake. The writer was severely handicapped by his inability to speak the Spanish language, especially in giving instructions to salesmen. We engaged two young men who could speak some English, and we had evening school for a time in salesmanship; but the lesson of courtesy was unnecessary, for the average Mexican is a modern Chesterfield when it comes to talking to a "Gringo." For the better class nothing is too good. We made many sales of more than $500 "Mex.;" but the natives are very economical in home life, and need no lessons in the art of "kicking" over a high gas bill.

Common labor in Guadalajara is 50 centavos (25 cents gold) per day. Mechanics, such as carpenters, bricklayers, masons, etc., receive from 80 centavos to $1.25 per day of 12 hours. The men start at 6 A.M. and work until 8:30, when their wives bring their breakfasts. They sit upon the ground and eat their tortillas (corn ground and mixed with lime water, formed into flat cakes and fried) and beans. This constitutes their meal three times a day. The laborers must collect 25 cents each day in order to provide food for the next. Their household furniture consists of a serape (blanket), gaudy when new, which they use as an overcoat and covering at night.

The concession granted the owners is perpetual, but not exclusive. The coal we are using is from West Virginia, which comes via Tampico.

It should be stated that the Company starts with 32½ miles of main and 4 5 services, and has now nearly 300 consumers. Over 200 Humphrey gas arcs have been installed, which are a delight to the people, and the increase in business is only according to the capacity to fill the orders which, when the writer left, were a month in arrears.

CURRENT MENTION.

MR. T. C. MCKEEN, formerly at Belvidere, Ills., has taken up the duties connected with the post of Superintendent of the Galva (Ills.) Gas Light and Coke Company.

RECENT advices from St. Louis are to the effect that the City Councils of East St. Louis, Ills., agree that the St. Clair County Gas and Electric Company is under an agreement, recently reached, to supply gas and maintain the plant for providing power for the pumping station of a new outlet sewer, Falling Springs avenue, that city. The authorities bind themselves to pay $100 a month minimum, and 60 cents per 1,000 cubic feet over and above a stated quantity of gas used in the pumping station.

MESSRS. BARTLETT, HAYWARD & COMPANY have commenced work on the new storage holder, recently contracted for by the proprietors of the Roanoke (Va.) Gas and Water Company. The present storage capacity will be increased 200 per cent. when the new vessel is completed.

IT is with no little surprise that we learned of the resignation of Mr. Vernon K. Gould, Manager of the Bangor (Me.) Gas Light Company, since 1904, and connected with its development since 1897. The Bangor *Daily Commercial* in noting this determination of Mr. Gould followed the intimation with this history and comment: "Mr. Gould first became connected with the Company in 1897, when it was a local Company, and after it was absorbed by the American Gas Company, of Philadelphia, in 1901, he was appointed Manager. The Company has since increased its output of gas almost 3-fold. The number of consumer meters increased from 1,300 to 3,400 and the street mains of the city have increased from 18 to 38 miles. Gas service has been extended to the city of Brewer across the river and the gas works on Main street have been increased in general capacity so that these will take care of the requirements of Bangor even if it should double in size. In addition to this there has been added to the Company's equipment an up-to-date fitting and fixture department, together with all kinds of appliances used in the consumption of gas, as well as a maintenance and new business department. The courteous treatment of patrons and prompt attention under the management of Mr. Gould have been matters of most favorable comment. Mr. Gould was born on a farm in Milo, Piscataquis county, and remained there until 21 years of age, when he entered the University of Maine and graduated therefrom in 1897, locating with the Gas Company soon after. When asked about his future Mr. Gould said that he had nothing definite in view except that he should take a little time for recreation before entering any other line of business."

"W. B. V.," writing from Salem, N. H., under date of July 24th, says: "Drowsy, dear, beautiful old Salem awoke from its harmonious dreaminess last Saturday, when the picturesque nooks, fields and heights of Canobie Lake Park were alive to the joyings of a party of visitors, all employees of the Haverhill (Mass.) Gas Light Company, in Salem for the annual outing. I said 'all' employees of the Company; but that was slightly in error. There were 175 in the bunch, say, but a goodly percentage thereof were, generally stated, wives, sisters and sweethearts—perhaps an occasional aunt could have been 'spotted,' too. However, everything was as it should have been. There was music and dancing, fun and food, games and gaming, and a finer reunion never was had. The winners in the named events were: Baseball, single *v.* married team, won by former, 9 to 1; office force *v.* work force, won by former, 6 to 5. One hundred yard dash, won by E. Ryan. 'You and I' race, winner, Roy Evans. Relay race, won by John Foster. Three-legged race, won by Thos. Hoar. Sack race, won by Thos. Hoar. Swimming contest, won by John Foster. Those in charge of this eminently successful outing were: Superintendent H. von Diettinghoff, Thomas Nickerman, O. C. Johnson, M. Cannon—he did not make much noise, either—R. Evans, B. Streeter, F. Field, George Jones, C. Roberts, B. Stevens, Wm. Bell and Jos Christian."

REPLYING to "S. S. G.," whose inquiry bears date of the 26th inst., we have to say that our heretofore mention of the unfortunate affair which involved the credit of one Chandler (theretofore an officer of the Malden and Melrose (Mass.) Gas Light Company) is all that we care to state in relation to the case. The inquirer if he cares to examine the text of Judge Brady's decision regarding the case may find a full statement thereof in the issue of the Boston *Banker and Tradesman*, dated Saturday, July 22, 1911.

THE output of gas in Philadelphia from the plant of the United Gas Improvement Company in the quarter ended June 30th last, was 1,985,607,930 cubic feet. The output for the corresponding quarter of 1910 was 1,939,244,160 cubic feet.

"A. L. M.," writing from San Francisco, Cal., under date of the 21st inst., sends this: "For the purpose of assisting the City Attorney and keeping him advised of the progress of the refunding of impounded moneys to patrons of the San Francisco Gas and Electric Company, Judge Van Fleet, of the United States Circuit Court, appointed John T. Nourse, Sr., to be an assistant to the Special Master, Walter B. Maling, who has general superintendence over the refunding. The impounded money, exclusive of interest, amounts to $945,566, of which ½ goes to the patrons and ½ to the Company. The Company has put on a force of 125 men to go over the books to ascertain the amounts due each patron and to prepare checks to be transmitted by mail. These men will work 24 hours a day in 8 hour shifts. It is expected that the first checks will be mailed on July 25th. The work is a colossal one, there being upward of 80,000 consumers, and the expense of hiring this large additional force of clerks for several weeks will run up into the thousands of dollars. For the purpose of assisting the Company to pay this additional expense the Court has ordered that the interest due shall be divided equally between the city and the Company after the expenses of the Special Master and his assistants shall have been deducted. The total amount of interest is $24,506."

(*Continued from page* 71.)

volume of the gases will only be ½ what it was; namely, ½ of 20.96, or 10.48 per cent. Hence the volume of CO_2 is a measure of the air we are supplying. The following table is based on pure carbon with the theoretical quantity of air required for complete combustion taken as 1:

Per Cent. CO_2 by Vol. in Products of Combustion.	Air Supplied.	Per Cent. Excess Air.
20.96	1.00	0.0
19	1.10	10.3
18	1.16	16.4
17	1.23	23.3
16	1.31	31.0
15	1.39	39.7
14	1.49	49.7
13	1.61	61.2
12	1.74	74.6
11	1.90	90.5
19	2.09	109.6
9	2.32	132.8
8	2.62	162.0
7	2.99	199.4
6	3.49	249.3
5	4.19	319.2
4	5.24	424.0
3	6.98	598.6
2	10.48	948.0
1	20.96	1,996.0

Based on crude oil having a percentage of hydrogen that will not permit of a maximum percentage of CO_2 greater than 16, and taking the theoretical quantity of air as 1, the following table gives the excess air for various values of CO_2:

Per Cent. of CO_2 by Vol. in Products of Combustion.	Air Supplied.	Per Cent. Excess Air.
16	1.00	0
15	1.06	6
14	1.14	14
13	1.23	23
12	1.33	33
11	1.45	45
10	1.60	60
9	1.77	77
8	2.00	100
7	2.28	128
6	2.66	166
5	3.20	220
4	4.00	300
3	5.33	433
2	8.00	700
1	15.00	1,500

With the furnace as constituted, we cannot expect to obtain complete combustion with the theoretical quantity of air therefore, the volume of CO_2 will not equal the theoretical value. In the case of a furnace using coal as fuel, the varying thickness of the fire and varying resistance to the passage of the air through the fuel due to this and the presence of ash and clinker in the fuel bed, all tend to increased air supply. With good coal we may be well satisfied if we operate with 40 to 50 per cent. excess air. In the case of liquid fuel, such as petroleum, the air is brought more intimately in contact with it and a smaller amount of excess air is required.

The following table shows the approximate quantity of heat carried up the stack with various quantities of air. The fuel is assumed to be 1 pound of pure carbon, having a heating value of 14,600 B. T. U. The stack temperature is taken as 550° F., the temperature of the air supplied to the furnace as 70°, and the specific heat of the furnace gases as .24.

Per Cent. CO_2	Supply of Air in Per Cent. of Theoretical	Weight of Products of Combustion	Heat Gen'r'ted in B.T.U.	Heat Lost in B.T.U.	Heat Lost in Per Cent. of Heat Generated
20.96	100.0	12.56 lbs.	14,600	1,446	9.9
15.00	139.7	17.15 "	14,600	1,975	13.5
12.00	174.6	21.18 "	14,600	2,440	16.7
10.00	209.6	25.23 "	14,600	2,906	19.9
5.00	419.2	49.45 "	14,600	5,696	39 0

Neglecting the question of draft, stack temperatures are dependent to a certain extent on the pressures of steam carried in the boiler, as they have at least to be of a considerably higher temperature than that of the water and steam in the boiler. The stack temperature of a boiler under 150 lbs. pressure was 460°, and the temperature of the steam at this pressure should be 365°. Hence the minimum difference of temperature under these conditions was 95°. Had we cut down the air supply, which at this time was 50 per cent. in excess of the theoretical requirement, and not cut down the fuel supply, which in this case was oil, the temperature of the chimney gases would have increased a certain amount and the pressure in the boiler would have gone up so that the safety valves would have opened.

The apparatus required for making tests of the flue gases and the building up of boiler efficiencies should consist of: A thermometer for taking stack temperatures, a draft gauge, an analyzing apparatus, so constructed as to give us the percentages of CO_2, O and CO, a suitable form of hand-exhaust pump and a small rubber gas bag, all of which can be bought for about $50.

The apparatus listed above requires no particular skill for its successful and proper manipulation. In order to obtain samples of the flue gases we may make use of a piece of pipe, open at both ends, extending into the breeching to about its center and permanently left there. Connection is made between this sampling tube and the hand pump by means of a piece of rubber tubing. Any air that may have been in the sampling tube and connections having been withdrawn by a few passes of the hand pump, we connect the gas bag to the outlet of the pump and exhaust a sufficient quantity of the flue gases for our purpose. A reading of the thermometer is taken, also a reading of the draft gauge. Having made the analysis, and from it determined the excess air, we are in a position to know whether we should cut down the draft or increase it. Having made a number of these determinations for varying rates of steaming, etc., we can regulate the air supply by increasing or decreasing the draft with considerable accuracy. Having determined upon a number of rules or regulations by which the firemen are to be governed, we can, if time or convenience will not permit of anything more, occasionally make analysis to see that these instructions are being carried out. We may, by means of a sampling bottle, which collects an average sample of the flue gases for any period desired, obtain the average CO_2, excess air, etc., under which the plant is being operated, and in this manner compare the conditions with what we know can be obtained. We can be sure that, having reached a fair value in watts per gallon of oil or per pound of coal, or in any other terms of duty, any lessening of this efficiency, other conditions remaining the same, will surely point to lower furnace efficiency.

Draft regulation should be made by the damper in preference to the ashpit doors, in that by leaving the damper wide open and closing the ashpit doors, we increase the air leakage through the setting. We may be fairly certain that, unless we have given the matter particular attention, there is considerable air leakage both through cracks in the brickwork and through the pores of the brick itself. The nearer the leaks in the setting are to the furnace, the more heat will be taken from the boiler. We should carefully fill all cracks and openings with some form of mortar. A variety which has been used with good results is a mixture of magnesia and cement. The pores of the brick may be filled with some form of size or glue, or a cement wash. A small amount of money spent in this direction will prove a good investment.

There are a number of forms of CO_2 recorders on the market which automatically make analysis at intervals of 2 or 3 minutes, and record the per cent. of CO_2 in the flue gases on a chart. The chart is graduated in hours so that the CO_2 that obtained at any particular time can be obtained from the chart. The recorder is connected to the sampling tube in the breeching by means of piping, and so may be located at any convenient point. In order to obtain simultaneous records for the whole plant we would require one recorder for each boiler. We may, by a suitable system of piping, having a main or "bus" pipe running along the boilers near the breeching, make connection at will between the recorder and any particular boiler. Some difficulty has been experienced in the past by engineers in keeping these instruments in operation, but considerable improvement has been made of late in their construction and better results have been obtained. A recorder, if it were accurate—that is, continuously so—would have considerable advantage in that the fireman could see just what results he was obtaining at any particular instant. The CO_2 recorder is doubtless better adapted to the maintenance of furnace efficiencies than it is to the building up of same.

In the matter of the saving effected by means of increased boiler economy, as against increased operating expenses due to the cost of flue gas analysis, to what point will we have to go in order to show a net gain in dollars and cents? Using a central station as a basis:

Let Y = monthly output in Kwh.
X = ordinary efficiency in watts per gallon of oil or pound of coal.
Z = increase of efficiency over X in watts per gallon or per pound.
K = cost per pound of coal or gallon of oil in dollars.

Saving in pounds of coal or gallons of oil per month $= \frac{1{,}000\ Y\ Z}{(X + Z\ X}$

Saving in dollars = above term multiplied by K.

To take a concrete case: Assume a plant having a monthly output of 1,000,000 Kwh., and an ordinary efficiency of 2,000 watts per gallon of oil, costing 2½ cents, and that the efficiency is increased to 2,600 watts, the saving would be $2,884 a month.

We will assume the case of a plant operating with an efficiency of 1,800 watts per gallon of oil, that the plant is equipped with moderately economical engines and generators, and that there is at least one spare boiler and generating unit so that the station can be operated to the best advantage during periods of light load. The average monthly output is 100,000 Kwh. and the cost per gallon of oil is 2½ cents. Taking the cost of the equipment suitable for gas analysis at $60, which is to be paid out of the first year's saving of fuel, and the cost of a certain proportion of one man's time at $15 per month, the total cost of flue gas analysis will then be $20 a month. In order that we may come out even we will have to increase our efficiency to 1,826 watts. Under the conditions as stated, we could afford one man at $75 per month, provided he could raise the efficiency to 1,900 watts. To determine certain points relative to the efficiency that is being obtained we should know the number of heat units in the fuel we are using. In the absence of a calorimeter test, we may calculate the number of B.T.U. per pound of fuel with considerable accuracy, provided we have its analysis. With a fuel composed of 75 per cent. by weight of carbon, 10.5 hydrogen, 7.5 oxygen, 1 sulphur, 6 nitrogen, ash, etc., the heating value, according to the formula adopted by the A. S. M. E. is: 14,600 C + 62,000 (H — ⅛O) + 4,000 S, B.T.U. per pound.

Where C, H, O and S are the percentages by weight of carbon, hydrogen, oxygen and sulphur, using this formula with the above fuel the B.T.U. per pound = 16,919. To calculate the value of CO_2 which may be obtained as a maximum with any particular fuel, hence to know about how much to expect, and using the above fuel, we proceed as follows:

Since 8 pounds of oxygen are required for the combustion of 1 pound of hydrogen, the weight of oxygen in the fuel itself will neutralize ⅛ its weight of hydrogen. Hence the weight of hydrogen in 1 pound of the fuel under consideration that will require oxygen from the air will be, .105 − $\frac{0}{8}$ or .09563 pounds.

(1) 0.75 pound of carbon will require .75 × 11.56 = 8.67 pounds of air occupying 107.36 cubic feet, of which the oxygen occupies 20.96 per cent. or 22.5 cubic feet and the nitrogen the remaining 84.86 cubic feet. The products of combustion will be 22.5 cubic feet of CO_2 and 84.86 cubic feet of N.

(2) 0.09563 pound of hydrogen will require .09563 by 34.78 or 3.346 pounds of air, having a volume of 41.433 cubic feet. The products of combustion will be water, the volume of which we will not consider, as it condenses in the gas analysis instrument, hence is not measured, and 79.04 per cent. of 41.433 or 32.748 cubic feet of nitrogen.

(3) 0.01 pound of sulphur requires .01 pound of oxygen and hence .04347 pound of air having a volume of .538 cubic feet. The products of combustion will be .02 pound of SO_2 having a volume of .112 cubic feet, which will also be absorbed, and .425 cubic feet of nitrogen.

The above volumes are based on a temperature of 32° F., and will not be correct for the temperatures of the average boiler room. However, on account of the temperature coefficient being practically the same for all gases, they give us the relative volumes for any other temperature. Recapitulating, we have:

Element in Fuel.	Products of Combustion in Cubic Feet.
Carbon.....	22.50 cubic feet CO_2 and 84.86 cubic feet of N.
Hydrogen	H_2O and 32.748 cubic feet of N.
Sulphur.....	SO_2 and .425 cubic feet of N.

Total gaseous products of combustion 140.533 cubic feet, of which 22.50 cubic feet or 16 per cent. is CO_2.

Having made a complete analysis of the flue gases, and determined the volumes in per cents. of the oxygen, carbon monoxide and carbon dioxide, we obtain the per cent. of nitrogen in the flue gases by subtracting the sum of these from 100. Having made this determination we can calculate directly from the flue gas analysis the per cent. of excess air under which the furnace was operating at that instant. As given in "Stirling" the ratio of the total air supplied to the theoretical requirement is equal to $\frac{N}{N - 37{,}820}$ where N and O are the per cents. of nitrogen and oxygen respectively in the flue gases. The basis of this formula is that the nitrogen found in the flue gases is the content of nitrogen in the whole amount of air furnished. Since each volume of oxygen was associated with 3.782 volumes of nitrogen, and together formed the excess air, the difference between N and 3.782 O represents the content of nitrogen in the air that was actually required.

Taken from among the records of flue gas analysis made on a boiler burning oil are the following:

Time.	Boiler.	Damper Closed.	Temp. of Flue Gases.	Volumes in Per Cent.
1. 7 P.M.....	No. 10	2 notches	445°	CO_2 11.3, O 6, CO 0.1, N 82.6
2. 9:45 P.M..	No. 10	2 notches	460°	CO_2 11.7, O 6, CO 0.0, N 82.3

(1) The ratio of the air supplied to the theoretical is:

$$\frac{82.6}{82.6 - 3.782 \times 6} = 1.378$$

The excess air is, therefore, 37.8 per cent., and as the CO_2 is 11.3 per cent., the maximum value obtainable with the theoretical quantity of air would be 11.3 × 1,378, or 15.57 per cent.

(2) The excess air supplied in this case is 38 per cent., and the maximum value of CO_2 obtainable would be 11.7 × 1.38, or 16.14 per cent.

The following is the record of a central station using crude oil as fuel and the economy obtained over a period of several years:

Watts per Gallon of Oil.

Month.	1906.	1907.	1908.	1909.	1910.	1911.
Jan.....	2,132	2,748	2,408	2,334	2,722	2,745
Feb.....	2,265	2,786	2,611	2,324	2,559	2,895
March....	2,142	2,909	2,612	2,413	2,550	2,896
April	2,303	2,789	2,455	2,175	2,526	.....
May.	2,405	2,777	2,575	2,408	2,494	.....
June.....	2,410	2,820	2,159	2,530	2,269	.....
July.....	2,443	2,931	2,356	2,792	2,422	.....
August ..	2,321	2,608	2,216	2,951	2,547	.....
Sept.....	2,629	2,431	2,292	2,866	2,440	.....
Oct.....	2,556	2,302	2,332	2,868	2,435	. ...
Nov.....	2,498	2,501	2,353	2,942	2,550	.....
Dec... ...	2,682	2,562	2,428	2,898	2,682	. ...
For period	2,401	2,658	2,413	2,650	2,518	2,870
Kwh. Generated	7,115,668	9,483,192	10,350,781	11,645,894	14,019,359	3,925,037

During 1906 little or no work was done by the company in the the analysis of flue gases. In 1907 considerable attention was given to the matter, with the result that the efficiency was increased 257 watts per gallon. In 1908, due to increased activity in other lines, the subject was dropped, and the efficiency dropped back almost to what it had been two years earlier. In May, 1909, the work was again taken up systematically and has continued every since. The marked decrease in efficiency during June, 1910, was due to a breakdown which required the operation of a large number of small machines. During the period covered by these figures, very little or no change has been made in either the engines or the boilers or in other operating conditions, except in increased output. The maxium demand on the station having kept pace with the output, the load factor has remained practically the same. Hence, we may assume with tolerable certainty that the increased economy has in this particular instance been due almost entirely to the flue gas analysis.

In examining the detail records of the economy during the period as given, we find that the economy of the first shift, namely that from midnight to 8 A.M., was increased approximately 45 per cent., that of the second shift was increased 40 per cent., while the third shift, namely that from 4 P.M. to midnight, was only increased about 17 per cent. From this it would appear that during peak load conditions the air supply was regulated with some degree of accuracy, even though it was guesswork, but that during the periods of light load, it took a systematic analysis of the flue gases and a proper application of the facts so obtained to bring about results that have saved a great deal of money.

As a further example, we might cite the case of a central station in the Middle-West generating about 250,000 Kwh. a month and using anthracite screenings, which reduced its coal bill a total of 9 per cent. in 4 months, this period being shortly after the advent of flue gas analysis, from which we may infer that some suspicion is attached to the latter as the cause of the saving.

Relation of the New Business Department to the Gas Company.

[Prepared by Mr. George Williams, of Henry L. Doherty & Company, for the Montgomery Meeting, Southern Gas Association.]

This is a big business with many comparatively new problems. Like every other, its selling problem is its most vital and hardest one. There are no great authorities or no standard text books to give us specific information upon our new business work, though it is already an art and a profession.

The gas men of the past had their hard problems also. Their work was necessary and scientific; but, even had they had the time, they did not have the ability or inclination to sell the product, certainly not on the scale that companies are compelled to to day. The gas men of to-day realize that the industry is dependent upon its sales, and find every other phase of the business developed to a high standard with progressive manufacturers of equipment competent to build plants all ready to run. It is from daily effort, and from such conventions as this, from interchange of ideas through personal association and through the trade Journals that we will gain the knowledge that we now so much need.

The service demands, and is constantly adding, new branches of work. Progress comes by specialization. The progress of the industry is drawing an army from the best of the country's talent in many other lines. The men who manufacture appliances, experienced salesmen, artists, mechanics, and many other specialists, are being added to the forces of gas men by the very development of the gas industry. They are recognized as gas men by this Association, and are just as much so as the gas engineer or the chemist. The new business necessity is fast becoming recognized, for most of your companies already having organized new business departments or new business work going on in some form.

The conduct and character of the new business department are well worthy of discussion. Upon its success every other department, every other employee, the corporation itself, its rates, franchises and securities, are favorably affected. The men who finance the companies and make it possible to secure great sums of money to build for the future are among the first to see the need of efficient new business departments.

Whether new business departments consist of 2 men or 100 men, there are many common features that must be recognized, questions that are relatively the same to the company in a small city as to a company in a larger city.

There is a great market everywhere that is not generally appreciated, much less being earnestly sought after. The wide difference in per capita output in many cities shows that. In some cities gas is not being used for more than 50 different purposes, while in others 500. There is still a broad market for gas in the industrial, mercantile and domestic fields that has been scarcely sought. It is quite true that gas companies, though monopolistic in gas supply, still have a great variety of competition, and very strong competition at that, from other and older methods used for lighting and heating. Some gas companies have been unreasonably forced for the time being into unprofitable rates and burdensome working conditions. All the greater, then, is the need of active new business work. The supply of gas being a scientific and somewhat complicated industry in the minds of the laymen, it is not unnatural that the public is so far from being acquainted with the possible profitable uses for gas. It is possible only for an organized team working exclusively upon new business work to get in proper touch with our market. Only a very small proportion of possible sales voluntarily comes to the gas office. At the same time it is necessary that all employees outside of the new business department have a unity of purpose and sympathy with its work.

The selection of a new business manager is a serious thing. There are many traits to be looked for which will ultimately mean more than his present knowledge of the business. My employment has led me through an experience of working under and with several managers of new business departments. Even though I were to graduate to the job of being merely a stock or bondholder in gas companies, my experience would still lead me to hope that each manager of new business departments would be selected because he possessed, besides some knowledge of the business, a real sympathy that comes from "the heart out." He should also possess a great deal of courage, because he not only is compelled to wrestle with stubborn prospects, but with your own inexperience and shortsightedness in this particular line of work. No success was ever made in this or any other line of business without considerable outlay. Yet knowing this, we sometimes attempt big things in the interests of a million dollar corporation on the scale of a campaign consistent with that of a suburban grocery. Politeness and courtesy are considered essentials in business nowadays, yet good manners mean very little if they are not genuinely meant. Such a department manager will naturally attract around him men of his own calibre and these are the men by whom the public will judge the company, and upon whose personality means the success of a campaign. Men who never in their life did big, broadminded or generous acts in comparison to their circumstances, can hardly be looked to for the performance of big things for their employers or to induce customers into progressive acts. Along with this essential personality should be the faculty for system; the mere ability to sell is not sufficient in new business work, which cannot succeed without the maintenance of complete and detailed information of the consumer's equipment and the location of prospective business.

We cannot expect to find all the virtues and qualifications for ideal new business work in one man or in one department; but character must be recognized. It is of some use to pretty nearly everybody, but necessary in a successful business man. You will see experienced talent very scarce and much higher priced in the future. New men will have to be trained in your own property; but no other process will refine and secure the proper talent and high efficiency needed for profitable new business development than this new business work. In fact, the corporation offers a greater school for development of men into such character as the best of mankind aspires to, than does any other medium of education or society, the gas corporation especially, where its employees come in contact with people with every kind of character. We see how people live, we see them at their worst and at their best, we cannot avoid seeing their circumstances and their caliber. It is rare training. The new beginner may be crude, but if he is properly directed and has some of these suggested qualifications he will soon become an expert.

The new business head should direct the canvassing, advertising, street and office sales and all commercial plans; he should be consulted with on matters of policy. Managers sometimes unconsciously retard the development of the men and the work by assuming many minor duties in isolated instances that could be as well or better done by the new business man. Customers have to be trained for a short time to look to this department for their requirements.

The new business department should not be tied down with a lot of picayunish rules and minor accommodations for other departments. Its latitude should allow room for many experiments with schemes—liberal advertising, attractive salesroom, appointment and equipment of the gas office, ample stock and ample variety of appliances and fixtures. Observe that the public must become acquainted with the appliances and their merits before they will admire or desire them, and it is after this happens and not before that there will be liberal sales.

The present basis of compensation to the new business man seems to puzzle many managers who are inaugurating departments. We can adapt or learn much from those corporations that have maintained selling departments for many years, such institutions as insurance companies, manufacturers who sell direct to merchants, or bond houses. The unavoidable variety of ability in an organization prevents a uniform fixed salary, yet there are so many important duties that the new business representatives can perform that do not directly bring new sales, that a purely commission basis of compensation is neither just nor practical; therefore, many well organized departments have adopted the basis of a small, fixed salary, plus a proportion of the increase of revenue from each man's district. Some departments have gone farther by grading the fund thus provided in relation to the desirability of the business secured by each salesman. The latter method tends to improve manufacturing and distribution conditions, and some of these companies have made marvelous development of the industrial fuel output by this method. Selling ability commands the highest compensation; whether just or unjust this will prevail.

The benefits derived from increased output and a more uniform daily and hourly sendout are very apparent to the engineer and the operator. These benefits also appeal to the stockholder, if he has had experience. Consumers, too, would be interested if they knew it, for every community will participate in the healthy prosperity or development that comes to its public service corporations. An active new business department will silently do more in various ways for the benefit of a city than many other organizations of philanthropic intent.

The activity of the Southern Gas Association in these matters comes at an opportune time. Southern cities, which for so long have been conspicuous for slow growth in sales of gas, will rapidly improve. We will see bigger corporations, larger payrolls, more advertising, and greater industrial and mercantile progress. The present agricultural development will be followed by corresponding growth of cities and trade. The relation of the new business department to the gas company should be very close if we are to do our share toward the prosperity of the South and utilize the opportunities which are justly ours.

The specialization upon this topic should not tend to underestimate the importance of those men and departments which are not directly identified in new business work. The whole service is dependent upon engineers, operators, fitters, clerks and accountants; there are still alluring opportunities to men in those lines. The new business man is not always essential to service; he is, however, to successful operation. Many of his transactions, that might become a source of revenue to the company for many years, can be spoiled by the lack of interest in them by some employee who does not appreciate that salaries, success, continuous employment and often the difference between solvency and insolvency of corporations might rest upon the success of those details, that the solicitor finds necessary to carry out in order to give his customers what is right, what the customers have been promised, or what is experimental. The attitude of a telephone clerk, or the character of a letter to a customer, office impertinence, an imperfect appliance, or a delayed delivery, has in many instances destroyed or delayed revenue from sales for months and years, so has inattention of new business men to prospective trade. One department cannot avoid benefits that come to another. The new business department is entitled to support, it is also obligated to every other department. Men and departments and companies will always benefit from co-operation.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, July 8, 1911.

Coronation Illuminations.—Another Spontaneous Explosion.—New Ideas on Carbonization.—A Wrinkle on Oxide.

A particular feature of the festivities in connection with the coronation of King George V. was the illuminations, in which gas took a leading place, being unequalled as regards brilliancy and effect. Unlike fairy oil lamps and electric glow lamps, which do not possess sufficient diffusive power to show up their surroundings, the gas jets brilliantly illuminated the whole neighborhood. In a public building outlined by electric glow lamps, one cannot tell whether the design is carried on a building, or on a specially constructed frame with a black background, and standing a little distance off there is not light enough to recognize a passer at a few feet distance. It is very different with gas jets. The whole facade with every architectural feature is clearly visible, and the space in front of the building is as light as day. This fact should be borne in mind when making comparisons as to cost.

There was an exceedingly brisk demand for gas devices during the week preceding the event, and as a consequence the leading makers advanced prices 25 per cent. As usual, many people who waited till the last minute, and did not decide to decorate till they saw that their neighbors and rivals in business did not mean to be out of the running, were unable to obtain the designs they required at any price. The *Journal of Gas Lighting* publishes quite an imposing list of the principal buildings in London that were illuminated by gas, comprising town halls, public libraries, banks, assurance companies, railway offices, clubs, hotels, societies, embassys, traders, and large private residences. The whole frontage of the Vauxhall gas works, one of the stations belonging to the South Metropolitan Gas Company, was a brilliant blaze of light, and bore the motto, "Long Live the King," in letters of flame. Several extensive devices were carried out in the chief provincial towns, amongst which may be mentioned the town halls at Birmingham and Burton on Trent, and the gas offices at Cardiff, Southampton and Portsea. It should be observed that incandescent gas lighting now take a place as a means of consuming gas in the open, and this is an important advance that will have some effect on the everyday consumption of gas.

Last month I had occasion to direct attention to an explosion at Stalybridge, which was spontaneous in the sense that there was no contributing action such as the application of a flame. And it is a singular coincidence that a similar occurrence has subsequently taken place at the Effingham street gas works, Sheffield, resulting in the destruction of a 4 million capacity Lindsey washer, with some damage to adjacent connecting mains, and one man was so severely injured and burnt that he died in the course of two days. In this instance, it appears that the washer was in regular use, and had been standing off for cleaning in accordance with the usual practice. Like all other efficient washers, the Lindsey apparatus gathers an accumulation of thick tar, and this is thorougly cleaned, once during what is, or more accurately speaking what used to be, the light season, in order to avoid the rush of trouble during the winter. This had been successfully accomplished, the cleaning doors replaced, and ammoniacal liquor was being run in preparatory to the resumption of usual work. Two set pins were left out on the top of the washer, to afford a vent for the contained air as it was displaced by the liquid. A man in charge of operations was standing by the side of the washer, holding in one hand a lighted safety lamp, which was quite 3 feet away from and below the vent holes. Without any warning, a violent explosion occurred, breaking up the apparatus and the 24-inch connecting main, and tearing down the outlet valve. Gas came back from the holders in addition to that being made, and a large blaze was the result, but this was quickly subdued without further damage. Mr. J. W. Morrison, engineer to the company, in the course of his evidence at the Coroner's inquest, said that the safety lamp had been carefully tested and found to be in perfect condition, and there was no evidence of sparks or flame from other sources. The explosion was therefore the result of spontaneous combustion, possibly of greasy or tarry waste that had been left in the washer. The explosive mixture might have been due to a small leakage of gas through the valves, or to gases given off by the entering ammoniacal liquor.

This explanation is, if one may use the expression, less satisfactory in a general sense than the one recorded last month, because there was nothing elicited in the evidence of an unusual and abnormal character. At Stalybridge there was the uncommon circumstance of the washer having been out of use for two years and the cleaning had not been completed. A very considerable accumulation of rust sulphide in a finely divided and pyrophetic condition might have been present. But at Sheffield anything of this character, if present at any time, had all been removed. At this time of the year hundreds of washers throughout the country are opened up for cleaning, and there are no apparent reasons why a similar accident should not happen to any one of them.

A considerable part of the time at the recent meeting of the Institution of Gas Engineers was taken up by the discussion of the papers on carbonizing, with the result that the subsequent proceedings, dealing with distribution and other matters that are equally important, had to be hurried over and curtailed. This has led to the usual suggestions as to omitting the formal reading of papers and of exercising some control as regards length, etc. It is difficult, as I have before remarked, to get papers on any terms, and for this reason the authors of papers receive more consideration than—I say it without the slightest intention to give offence—they are fairly justified in claiming. The author of a paper is a benefactor to his race. But at the same time he should not be autocratic, but prepared to accept any reasonable suggestion that will assisst the progress of business or the convenience of the Council. Some discretion might be exercised, with advantage, as to omission of the reading of the paper by the author but the difficulty is to avoid offending the party whose communication—possibly in his own eyes the gem of the agenda list—is "taken as read," whilst other authors are selected to make an appearance at the reader's desk. A great deal of the trouble is caused by the authors themselves. The time of the reading is limited, and if readers remembered this and limited the scope of their remarks in proportion, we should hear less about papers being read. There is very little advantage in reading tabular matter, going deeply into history or in summarizing matter that has already appeared in our literature. A "paper" should not be a "communicated article," a "memoir," or a chapter from a serial treatise. If written to the point and comprised as it might be within a limit of 10 to 20 minutes for easy (not hurried) delivery, the membsrs will be glad to listen to it. But what they do not want, and I have not any paper that has been actually read in view in this description, is a treatise, paper and discussion all mixed up, having a long introduction, a vast amount of detail, sufficient for a dozen papers, and answers to anticipated objections. A paper of this kind is complete in itself, and leaves little room for any discussion. Another common error is to value a paper by the length of the discussion or by the number of speakers. A small matter of everyday experience will bring a large number to their feet, and seems a long but not necessarily useful or novel discussion. An important new departure may be related in a few words and be received with little or no discussion for the simple reason that no one else has tried it.

While something can be done as regards the paper, the progress of

the discussion presents greater difficulties, because as long as a speaker keeps within the four corners of the subject it is difficult for the President to check his eloquence. But if the time limit can be applied to papers, there is the more necessity for putting it on the discussions. Many a promising debate has been nipped in the bud and brought to an untimely end because the first two or three speakers have occupied all the available time. It should be quite possible for the President to decide on a time limit according to the value of the subject, and I venture to think that most of the speakers would get in their chief chief points if a regulation of this character was announced at the commencement of the discussion.

The number of carbonizing processes now in vogue is simply bewildering, and almost every leading engineer seems to have gone on a different tack. The rank and file are, therefore, in a state of confusion as to the merits of continuous verticals, in which the supply of coal is continuously passing in at the top while the coke leaves in a similarly unbroken course at the bottom; of intermittent verticals, which are entirely emptied at convenient intervals and filled up with a fresh charge; and of semi-intermittent verticals, in which a portion of the coke is withdrawn from the bottom, perhaps once in three hours, and replaced by a similar quantity of coal at the top. Then some claim to get results equal to anything shown by the verticals with the ordinary horizontal settings and heavy charges controlled by machinery. And the chamber system finds its advocates. The continuous or partly continuous process possesses the important advantage that it is entirely inclosed. There is no escape of smoke, steam or gas either at one end or the other. Against this, we are told that a continuously moving charge gives small, inferior coke, and that if large coke is required there must be a certain period of rest to enable coherence to take place. The vertical retort on the whole would appear best suited to modern requirements and will probably prove the strongest survivor.

The firing of oxide when emptying a purifier is so common, in these days of large area that cannot always be cleaned and spread within the limits of a single working day, that any suggestion in the way of a preventative calls for careful consideration. And, therefore, attention may be directed to a very simple suggestion put forward by Mr. H. Townsend in the columns of the *Gas World*, to the effect that any trouble can be prevented by putting a purifier the last of the series in rotation for a short period, say 24 hours, immediately preceding its discharge. He works four boxes on the alternating system, and two catch boxes, and follows the usual plan of admitting 2½ per cent. of air, and the result of this treatment is that the oxide is revivified and rendered inactive before exposure to the air. He claims that the oxide is perfectly safe and that neither the workman nor the neighbors are annoyed by offensive odors, there being no indication outside the works that a purifying box is open. Oxide that has passed over 250 million cubic feet of gas and becomes charged up to over 50 per cent. of sulphur has been successfully treated by this method. It would appear that a considerable excess of air must be used if sufficient remains in the gas at the inlet of the catch purifier to revivify the contents of that vessel in 24 hours. One could imagine that the bulk of the oxygen would have been previously absorbed. Possibly the stale purifier may have been already partly revivified under the working of the alternating system.

Recent Patent Issues.

Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

997,962. Gas Producer. A. S. Cambridge, Keighley, England.

997,982. Apparatus for Manufacturing Gas and Lime. G. G. Floyd, Kirkwood, Mo.

997,987. Safety Signaling Service for Gas Connections. F. Frey, Cleveland, O.

998,089. Fluid Meter. A. L. Hansen, Chicago, Ills.

998,168. Gas Producer. J. R. George, Worcester, Mass., assignor to Morgan Construction Company, same place.

998,234. Process of Recovering Acetic Acid in Producer Gas Plants. W. J. Crossley and T. Rigby, Manchester, England.

998,297. Gas Mixer. E. McArdle, Cincinnati, O., assignor of one-half to G. C. Schneider, same place.

998,491. Gas Scrubber. W. H. Frost, Los Angeles, Cal.

998,546. Gas Generating Apparatus. J. M. O'Neall, Fort Worth, Tex.

Items of Interest
FROM VARIOUS LOCALITIES.

Mr. W. J. McCorkindale, Manager of the Marquette (Mich.) Gas and Electric Company, who several weeks ago was engaged as Consulting Engineer by the city of Escanaba, Mich., arrived home from there the afternoon of the 18th inst., after having consulted with the city officials respecting the contract for the construction of a new gas plant, that will involve an expenditure of $25,000, exclusive of any provision on main account. The contract, which was awarded to Mr. Fred. W. Freese, of Fort Wayne, Ind., includes all the machinery, the gasholder and other equipment for the plant, also the buildings in which it is to be installed. The new plant will not only have a larger capacity than the old one, but it is also certain that the quality of the gas will be higher. The task of building will be completed by November 1st.

Mr. W. M. Lewis, Manager of the Willimantic (Conn.) Gas and Electric Light Company, writing under date of the 21st inst., says: "In looking over your issue for two weeks ago, I noticed an 'Item' stating that this Company had a Directors' meeting and did not approve of certain extensions. I am at a loss to know where you received such information, as it is incorrect. The Willimantic Gas and Electric Light Company did not hold any Directors' meetings since early in the year, but the regular quarterly meeting of the Rockville-Willimantic Lighting Company was held at Willimantic a short time ago. There were no extensions or improvements before the Board that were turned down. It has been my good fortune to have all improvements and extensions that were placed before the Board passed on favorably."

We are glad to say that the veteran-President of the United Gas Improvement Company, of Philadelphia, Pa., has again come out victorious in his contest with illness. He hied himself to his handsome home in Atlantic City, went through a system of treatment that was anything but easy, and his rather tough constitution responded satisfactorily to the regimen. The fact that he is back at his writing table in the "big shop on Broad street at Arch" is the proof of our statement.

That the men-in-charge of the affairs of the North Shore Gas Company, Waukegan, Ills., are "on the job" would look from the fact that, beginning the 1st inst., bills are to be rendered at the former gross rate of $1.10 per 1,000 cubic feet, prompt payment (within 10 days) to secure the following discounts: Gross, $1.10; first 20,000 cubic feet, 10 cents per 1,000; for the first 30,000, 20 cents; for the second 10,000, 25 cents; for all in excess of 40,000 cubic feet per month, 40 cents. The quantities must be registered through one meter.

All days are alike to Prof. E. W. Bemis, who is on any job—legal holidays and holy days as well, which conclusion is reached from the detailed bill, recently submitted by him to the authorities of Chicago, for his advising with them over the inadequacy of the report submitted to them by Mr. W. J. Hagenah, in an attempt to reach a fair figure which the Peoples Gas Light and Coke Company, of Chicago, might charge its patrons. The bill covered railroad fares, hotel bills, telephone service, stationery, rent of typewriter, and so on, and totaled $2,559. For services he billed the "Harrison bunch" at $65 per day, for $2,145, or 33 days at $65 per day. The datings are from May 29 to June 30, which period includes three Sundays and Decoration Day. Another peculiar thing about the itemized bill is that every charge comes out exactly even in dollars. Not a single cent appears in it anywhere.

On July 19th the proprietors of the Jackson (Mich.) Gas Company filed in the office of the Recorder an affidavit averring that the output of gas from the works for the twelvemonth ended June 30, last, totalled a quantity equaling 102,304,900 cubic feet.

Mr. V. A. Martin, of La Porte, Ind., has purchased the plant and franchise of the Greencastle (Ind.) Gas and Electric Light Company.

"T. M. G.," writing under date of the 22d inst., from Boston, Mass., incloses the following, from the Boston *Transcript*: "Mr. William Penn Hazeltine, for many years Superintendent of the electrical division of the Lynn Gas and Electric Company, died in that city the morning of the 18th inst., after an illness of several months.

He was born in Hilleker, N. H., and for a time was principal of the evening drawing school in Lynn. He was one of the first constructing engineers of the Thomson-Houston Electrical Company, and in 1890 became connected with the Lynn Company. Deceased was a graduate of the Lynn High School and of the Friend School, Providence, R. I.; he was also a member of the Oxford Club, of Lynn. His widow and their four children survive him."

AT a meeting of the Troy (N. Y.) Gas Company, held the 19th inst., Mr. Edward Murphy, 2d, was elected Vice-President, succeeding the late Mr. Francis J. Malloy; and Messrs. Murphy Thos. Vail, Frank Gilbert and M. F. Sheary were named to the vacancies on the Board of Directors.

AN odd suit for damages is that instituted by Edward J. Westermayr, of Syracuse, N. Y., who is plaintiff in proceedings before the Supreme Court, against the Utica (N. Y.) Gas and Electric Company and John Steeple, a contractor. While engaged in painting a high smokestack to and from the Company's power house, the afternoon of March 22d, he fell to the ground sustaining severe injuries. For these he prays for the sum of $10,000.

THE Southern Counties Gas Company, of Monrovia, Cal., makes the announcement that beginning to morrow, it will furnish gas from its Monrovia plant to the settlements of Arcadia, Santa Anita, El Monte and the intervening territory. Sierra Madre is already supplied therefrom. Of course, high pressure will prevail.

MATERIAL for the proposed important pipe line extension to Randolph, Mass., from the plant of the Brockton Gas Light Company, are on the ground. This means the placing of 20 miles of pipe, and some of the construction will be through rather difficult territory for work of this nature.

THE Massachusetts Board of Gas and Electric Light Commissioners has named September 12th as the date to hear the petitioners who ask for a reduction in the selling schedule of the Natick Gas Light Company.

MAYOR HARRISON has signed the ill-digested ordinance recently adopted by Chicago Councils, fixing the prices or rates that may be charged for gas in that city by the Peoples Gas Light and Coke Comyany in the next half decade. The prescribed rates are: For the ensuing year, 75 cents per 1,000; for the two following years, 70 cents; for the two final years, 68 cents. The measure will, of course, be carried to the court of last resort.

THE residents of Morris Plains, N. J., have unanimously voted to grant a franchise to the Public Service Gas Company, under which the latter may supply gas to the named place for a period of 50 years.

A RECENT issue of the St. Louis *Globe Democrat* declares there is a "possibility" that St. Louis will be supplied with natural gas by the agency af a pipe line leading from the wells at Carlyle, Ills., a distance of 50 miles away. The paper further notes that its authority regarding the fond hope in question, is traceable to an expression of opinion in the premises by Mr. W. M. Laird, a wealthy shoe manufacturer of Pittsburgh, Pa. He is also President of the Surpass Oil and Gas Company. Judging from the present status of the natural gas field in and about Carlyle, many will join us in giving utterance to the thought that if natural gas is piped therefrom and thereto it will indeed be surpassing strange.

AT a meeting of the Public Service Commission, of Webster Groves, St. Louis, Mo., the subject mainly occupying the attention of the conclave was the matter of the rates. It goes without saying that the "Grovers" considered these were altogether too high. However, the flood of objections was dammed when Mr. A. C. Einstein, who stands high in the councils of the St. Louis County Gas Company, which corporation supplies gas to the "Grovers," arose and declared that by December 10th gas would be sold to them in any desired quantity or volume.

"B. B. M.," writing from Philadelphia under date of the 24th inst., says: "The outcome of the contest between the officials of Carlisle, Pa., and the proprietors of the Carlisle Gas and Water Company, which ontcome was developed last week, seems to have been a victory for Mr. John Hays, President of the Company, who, although well along in years, seems fully able to lead a combat. However, this is the upshot of the countering: The Councilmen agreed to an indefinite discontinuance of suits and inaction by private individuals respecting injunction proceedings; withdrawal from sale of the stock owned by the borough in the Company; to end the project of granting an electric franchise to an independent company; relieving the Company of charges for interfering with the pavement. On the other hand, the Company agreed to reconnect those from whom power was cut off; to permit Council to name Trustees to the Board of the Company; to continue free fire plug service."

ON July 22d, in Common Pleas Court No. IV., Pittsburgh, Pa., Justice J. M. Sweearingen decided that an injunction should issue against the Manufacturers' Light and Heat (natural gas) Company, in restraining that corporation from shutting off the gas supply to the municipal buildings and church edifices in the districts known as Bellevue, Coraopolis and Glenfield; further, that the costs of the proceeding be put upon complainants. In his opinion, Judge Sweearingen narrates that the Company had assumed obligations binding upon predecessor companies to supply gas to municipal buildings, churches, etc., without charge therefor, in return for certain franchise grants, wherefore the contracts must be enforced, and may not be abandoned.

THE proprietors of the Carolina Works and Power Company, of Durham, N. C., have authorized the Gas Machinery Company, of Cleveland, O., to construct for them a completely new installation of silica retorts and settings, and provision is made in the plans for future extensions along similar lines.

THE authorities of Winnipeg, Manitoba, have decided to purchase, from Sir William Mackenzie and associates, the entire plant of the Winnipeg Electric Railway Company. The property includes the local gas and electric lighting plants. It is said the purchase price agreed on was not far from $15,000,000, which would seem large enough to cause Sir William to part from the properties without a single regret.

MONROE, WASH., is now being supplied with gas from the plant at Everett, Wash., the hooking up line having been completed about a fortnight ago. Manager W. W. White says that 127 consumers have been signed up, which number he declares will be doubled before the snow begins to fall.

DEEDS recording the transfer of 140 acres of land, running along the Potomac river not far from Chain bridge, have been filed by the Georgetown (D. C.) Gas Light Company. The title to this section was in George S. and Clara F. Grandy, and it had been known as "Low Grounds." It is a long, irregular, but not overwide strip of land lying between the Chesapeake and Ohio Canal, and it is thereon that the new plant of the Georgetown Company will be located. By-the-way the plans for this are being prepared by Mr. W. W. Randolph, of New York.

THE legal division of Chicago's government has rendered an opinion on the requisition of Public Works Commissioner McGann in respect of the application of the Peoples Gas Light and Coke Company, for the right to construct a tunnel under the north branch of the Chicago river at North avenue. The opinion was adverse to the Company. Think of it, that one could be refused permission to cross over or under that travesty named a river!

THE output of the Brooklyn Union Gas Company for the year 1910 reached the surprising total of one thousand millions cubic feet. In that total the various outputs of 4 subsidary Companis (Jamaica, Newtown, Richmond Hill and Woodhave) are included. The gains in respect of these subsidaries are really amazing. Here is a statement thereof:

Name of Co.	Output, 1909. Cubic Feet.	Output, 1910. Cubic Feet.	Increase. Cubic Feet.
Jamaica.....	97,593,669	112,451,096	14,808,428
Newtown.....	444,601,918	520,176,805	76,524,893
Richmond Hill.	94,083,286	106,380,061	72,291,675
Woodhaven.....	145,056,552	144,144,325	29,087,772

THE Kankakee (Ills.) Gas and Electric Company, which was recently a part of the possessions of the Kelsey-Brewer syndicate, has been taken over by the Chicago Suburban Edison Company.

The Market for Gas Securities.

The balance of trading for the week finds Consolidated gas off virtually a point from the figures of the prior week. The opening to day (Friday) was 145⅞ to 146. The increase in sendout, as between the ⅓ and par periods, keeps on. Possibly the long talked of capital rearrangement will be brought off next week.

Brooklyn Union stiffened up some, but at the quoted figures it seems rated very low, particularly when we remember that its cash (or virtually so) surplus is at least equal to three fifths of its capital. Lacledes are steady to strong, and Peoples, of Chicago, also manages to maintain recent quotations, despite Bemis and the others of that bunch of Chicago money getters. Shares of both classes in the Massachusetts Gas Companies are to all intent at par.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JULY 31.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$72,17[illegible]	100	144¾	145
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1s Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	143	145
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¼	107
Yonkers	200,000	500	180	—
Out-of Town Companies.				
Bay State	50,000,000	50	¾	⅛
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	51	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,666,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¾	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,463,684	100	106½	—
Mortgages, 5's	3,490,000	—	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,590,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100¼
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	250,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	106¼	107
Preferred	2,500,000	100	94½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	106¾
Massachusetts Gas Companies, of Boston	25,000,000	100	95¼	95½
Preferred	25,000,000	100	97	98
Montreal Gas Co., Canada	3,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	106½	106¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104⅜	105⅛
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	112⅛	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington D. C.) Gas Co.	1,600,000	200	442	444
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ———— Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, M. J. Brayton, Utica, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. 25, 26, 27, 1911, Chicago, Ills. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 26 West 39th street. New England, Secretary, W. S. Farrow, 1240 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, S. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, F. H Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May. ——, 1912; Clinton, Ia. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, October 23-28, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912, Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association – President, John M. Garard, Columbus, O; Secretary-Treasurer T. C. Jones, Delaware, O.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers President, C. W. Butterworth, Millon, Pa; secretary-Treasurer, William H. Merrit Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 80th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers: President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, April 27, 28, 29, 1912; Houston, Tex. Officers: President, J E. Carroll, Beaumont, Tex.; Secretary, D. G Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.